M1

© THE QUEEN'S PRINTER FOR ONTARIO
2000

REPRODUCED WITH PERMISSION

L'IMPRIMEUR DE LA REINE POUR L'ONTARIO

REPRODUIT AVEC PERMISSION

micromedia
a division of IHS Canada

20 Victoria Street
Toronto, Ontario M5C 2N8
Tel.: (416) 362-5211
Toll Free: 1-800-387-2689
Fax: (416) 362-6161
Email: info@micromedia.on.ca

SYNOPSIS FROM:

THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES
Final Report: The Trial Audit & Recommendations

Full report can be obtained by e-mailing:
kirsty.cummins@mol.gov.on.ca

Ian M. Plummer
Peter W. Strahlendorf
Michael G. Holliday

31 July 2000
(revised 21 September 2000)
(revised by Steering Committee 23 October 2000)

Index

- Introduction
- The Internal Responsibility System (IRS)
- Audit Approach
- Audit Validation
- Analysis of Questionnaires
- Analysis of the IRS at All Levels of the Orgainzation
- Conclusion

SYNOPSIS

INTRODUCTION

This is the third and final report of a study on the Internal Responsibility System (IRS) in Ontario underground mines. *(Note 1)* Our main aim has been to develop an audit tool through which the health of the Internal Responsibility System in a mine can be assessed. This report describes the validated audit tool, as a result of its being tested in a trial audit on six mines, and contains suggestions for further improvement of the tool and for its administration by others.

The study has been conducted with the oversight of the IRS Steering Committee consisting of government, industry and labour representatives. This committee selected the six mines at which to test the trial audit tool-four hardrock mines (two gold mines and two base-metal mines) and two soft-rock mines: *(Note 2)*

Falconbridge Ltd. Kidd Creek Mine Timmins	Inco Ltd. Creighton Mine Copper Cliff	Georgia Pacific Corp. Caledonia Mine Caledonia
Sifto Canada Inc. Goderich Mine Goderich	Placer Dome Canada Ltd. Musselwhite Mine Thunder Bay	Teck-Corona Operating Corp. David Bell Mine Marathon

101-02298/

These mines were not a random sample of Ontario underground mines but were chosen so as to provide a broad range of both mine types and health and safety performance. In addition, the Steering Committee selected two mining-contractor operations to which the audit tool was to be administered, with the primary purpose of investigating the IRS interface between mine and contractor employees. The visits took place from the end of February to the beginning of April 2000.

THE INTERNAL RESPONSIBILITY SYSTEM (IRS)

With the assistance of the IRS Steering Committee we produced a description of the Internal Responsibility System. The roles and responsibilities of the contributors to the IRS, as well as a number of processes important for a successful IRS, are all set out in this description. The model of the IRS we developed is consistent with previous descriptions in the Ham and Burkett Reports. The questionnaires administered in the trial audit and our interpretation of the responses were based on the description.

Description of the IRS

The IRS is a system, within an organization, where everyone has *direct* responsibility for health and safety as an essential part of his or her job. It does not matter who or where the person is in the organization, they achieve health and safety in a way that suits the kind of work they do. Each person takes initiative on health and safety issues and works to solve problems and make improvements on an on-going basis. They do this both singly and co-operatively with others. It is one of the *personal* responsibilities of a company President to ensure that the entire system of direct responsibility for health and safety within a company is established, promoted and improved over time. Successful implementation of the IRS should result in progressively longer intervals between accidents or work-related illnesses.

In addition to those with *direct* responsibility, a number of people and agencies have *contributive* responsibility for health and safety. Within any organization, the Joint Health and Safety Committee (JHSC) has a key contributive part:

- in health and safety in general, and
- in making the IRS work well.

The organization's health and safety staff *(Note 3)* also play a *contributive* role.

Assisting the IRS from *outside* the organization are the Safe Workplace Associations (e.g. MASHA), the Ministry of Labour (MOL), Unions *(Note 4)* and others. The MOL may exercise direct authority to resolve health and safety problems in the workplace, principally through its inspectors issuing orders. Listed in Table A are the direct and contributive components.

Keys to a Successful IRS

1. Everyone must have a sincere wish to prevent accidents and illnesses;
2. Everyone must accept that accidents and illnesses have causes that can be eliminated or greatly reduced;
3. Everyone must accept that risk can be continually reduced, so that the time between accidents and illnesses get longer and longer;
4. Everyone must accept that health and safety is an essential part of doing his or her work (health and safety is not an extra, it is part of doing the job);
5. Every person must have a clear understanding of what he/she is responsible for; what he/she can do to change matters; and when things must be done;
6. Every person must be regularly asked to explain what they have done to ensure health and safety on the job and in the workplace;
7. Everyone must have a clear understanding of their own skill, ability and limitations, and should have the capacity to carry out their responsibilities;
8. Everyone must attempt to avoid conflict when trying to reduce risk;

9. As an individual, each person must go beyond just complying with health and safety rules and standards, and strive to improve work processes to reduce risk;
10. When an individual cannot reduce risk by him/herself, then they must cooperate with others to go beyond just complying with health and safety rules and standards, and strive to improve work processes to reduce risk;
11. Everyone must understand the IRS process, believe in it, and take steps to make it effective at all levels in the organization; and
12. No one should be fearful of reprisals when using IRS processes.

AUDIT APPROACH

The audit tool consisted of four major components:

- administration of questionnaires to individuals that represent each level of responsibility associated with the IRS;
- follow-up interviews with a representative sample of questionnaire respondents;
- observation and discussion of the situation in the workplace; and
- documentation selected by the mine's JHSC to provide examples of how their IRS was being implemented.

TABLE A: *Participants with Direct Responsibility in the IRS and Those with a Contributive Role*

PARTICIPANTS IN INTERNAL RESPONSIBILITY SYSTEM	
Direct Participants	**Contributive Participants**
Members of Board of Directors Executives Managers Supervisors Workers	*Internal* Joint Health and Safety Committee Health and Safety Staff *(Note 5)* Engineers*(Note 5)* Other Staff*(Note 5)* Union(s)*(Note 6)* *External* Union(s) *(Note 6)* Safe Workplace Association Workers' Centre Ministry of Labour WSIB Suppliers

There were 10 different questionnaires-for six levels of direct responsibility and for four levels of contributive responsibility:

Direct Responsibility	Contributive Responsibility
Company Directors Senior Executive Officers Mine Managers Senior Supervisors Front-line Supervisors Workers	Co-chairs of the JHSC Certified Members OHS Specialist Ministry Inspectors

Each questionnaire consisted of some 30 to 40 questions. With the exception of the first question (which was in multiple-choice format), there were two types of questions. One type asked whether the

respondent "strongly disagreed", somewhat disagreed", somewhat agreed", or "strongly agreed" with a statement concerning an aspect of the IRS as it applied to the respondent's work. The other type of question asked for direct information in the form of "Yes/No" answers.

At each mine, we administered questionnaires to about 25 workers (the numbers varied between 14 and 27), five front-line supervisors (the numbers varied between 3 and 7), three middle managers (the numbers varied between 0 and 5), the mine manager, the two JHSC co-chairs and two certified members, and the health and safety co-ordinator. At each site, we conducted follow-up interviews with about one third of the workers and front-line supervisors, about half the middle managers and JHSC members, and the mine manager and the health and safety co-ordinator. We also informally interviewed workers as we took a tour of the underground mine. In addition, we asked each mine to provide us with documentary evidence that they felt would serve to illustrate functioning of the IRS at the site. Off site, we administered questionnaires to the MOL inspector(s) responsible for the mine, and attempted also to administer questionnaires to two senior executives and a company Director for each mine, and conducted follow-up interviews with all who answered the questionnaires. The numbers of questionnaires administered and interviews carried out are presented in Table B.

TABLE B: *Tally of Questionnaires Answered and Follow-up Interviews Conducted During the Trial Audit*

	QUESTIONNAIRES ANSWERED	FOLLOW-UP INTERVIEWS
Company Director	4	4
Senior Officers	10	9
Mine Managers	8	8
Middle Managers	19	13
Front-Line Supervisors	34	18
Workers	151	56
Co-Chairs	11	8
Certified Members	15	13
H&S Co-ordinators	7	7
Inspectors	8	8
TOTAL	**267**	**144**

AUDIT VALIDATION

To validate the audit tool, we compared responses to groups of questions with the safety record of the mine. The safety statistic we primarily used of this comparison was total medical injury (TMI) frequency. *(Note 7)* In order to make the comparison meaningful, we needed to calculate frequencies over a reasonably long period. Because the safety statistics of one of the six mines only started in 1997, we used the period 1997 to April 2000.

Complete analysis of the vast amount of data collected from the six mines visited in the trial audit would have taken many months more than the time and resources available to this project. Accordingly, in the validation, we chose to concentrate on two facets of the data contained in the questionnaires. One involved a question that probed what respondents believed the IRS ***should be***, and the other looked at groups of questions that have a bearing on various aspects of actual IRS performance. Individual

Perception of the IRS

The first question (Question 1a) on every questionnaire was a multiple-choice question and consisted of 13 separate statements. It asked respondents about what they thought the IRS ***should be***, and was administered to all levels in the responsibility system. Because the same question was asked of everybody, the responses give a very good overview of the current understanding of the IRS at the mines-see Table C.

TABLE C: *Summary of Answers to Question 1a as Percentages*

"I believe that the Internal Responsibility System (IRS) **should be** where:	Wkr n= 151	FLS n= 34	MM n= 19	Mgr n= 8	Exec n= 10	Dir n= 4	JHSC n= 26	HSC n= 7	Insp n= 8	Avg. n= 267
a) everyone (from the rockface to the Boardroom) looks after health and safety as part of doing their job;	88	91	100	100	100	100	100	100	100	**92**
b) the workers are the only ones to look after their own and co-worker safety;	11	6	0	0	0	0	0	0	13	**7**
c) the supervisors and managers co-operate with the workers to head off and solve problems;	71	94	95	100	80	100	96	100	100	**81**
d)we all work together to make things better by reducing or eliminating the health and safety risks;	81	97	95	100	100	100	96	100	88	**88**
e) the Health and Safety Committee is directly responsible to make the workplace safe;	24	15	11	13	20	50	19	0	25	**21**
f) the Company President has some responsibility for the worker's health and safety;	67	79	79	100	100	100	81	86	78	**75**
g)the supervisor only makes sure the workers follow the rulses and procedures	9	3	0	0	0	0	4	0	0	**6**
h) if the worker cannot fix the problem, the supervisor will help find the answer;	77	91	79	100	80	100	88	86	75	**82**
i) if the worker cannot fix the problem, the only way out is to refuse to work;	11	3	0	0	0	0	0	0	0	**7**
j) the Health and Safety Coordinator finds the problems and tells the workers to fix them;	11	6	0	0	0	0	4	0	0	**7**
k) the Health and Safety Committee are resources;	66	79	79	100	100	100	92	100	88	**75**
l) the Health and Safety Committee help resolve issues when other ways fail;	68	76	89	50	40	25	77	57	88	**70**
m) we go beyond fixing problems and try to improve the health and safety in the work processes."	66	79	84	100	90	100	88	100	88	**75**
"SCORE"	**60**	**80**	**85**	**91**	**82**	**81**	**85**	**91**	**82**	**70%**

The overall understanding of the IRS at the mines involved in the trial audit, using the scoring scheme in

the footnote below, *(Note 8)* stood at 70 percent. In general, understanding improves as one moves up the line of direct responsibility within the mine site. Mine workers, as a group, show the lowest level of understanding and mine managers show the highest; understanding decreased somewhat at the corporate level. The health and safety component (JHSC members and health and safety co-ordinators) also showed high levels of understanding. Similar distributions in understanding were also seen when the mines were looked at on an individual basis.

The success of this multiple-choice question in giving a "snapshot" of the level of understanding of the IRS at a mine site became apparent to us early in the trial audit visits. And, because of this, we took the opportunity to combine the multiple-choice question with a supplementary question asking the respondents for an assessment of how the IRS was actually working at their workplace. In this question, respondents were asked to say whether they "strongly disagreed", somewhat disagreed", somewhat agreed", or "strongly agreed" with the following statement: "Given my answer to the Question 1a, I believe the IRS is working effectively in my workplace". *(Note 9)* This supplementary question (Question 1b) was used at four of the six mines.

Working on the assumption that individual respondents' assessments of the IRS in their workplaces (i.e., Question 1b) are of greater validity the higher they scored on the understanding part of the question (i.e., Question 1a), we multiplied each individual's score for 1b by their score for 1a. The resulting product is a measure of the effectiveness of the mine's IRS according to that individual. We looked at the effectiveness of the mine's IRS, as judged by mine-workers' responses to Questions 1a and 1b (mine workers were the only group that really contained enough responses to make a comparison valid), and compared them with that mine's safety record. The result of this comparison is shown in Figure A. There is a remarkably good relationship between the effectiveness of a mine's IRS (as measured by worker responses to Questions 1a and 1b) and its safety performance-the higher the score to the Q1a*Q1b combination, the lower the TMI frequency for the mine is likely to be. *(Note 10)*

FIGURE A: The Relationship Between a Mine's Safety Performance and the Effectiveness of Its IRS (as measured by workers' responses to Questions 1a and 1b)

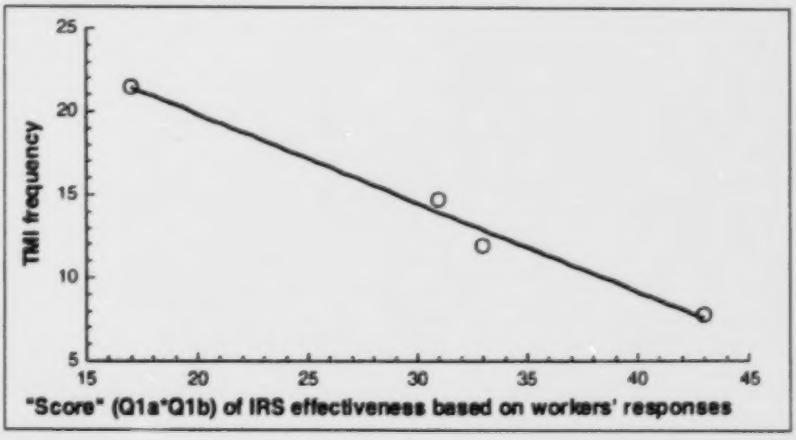
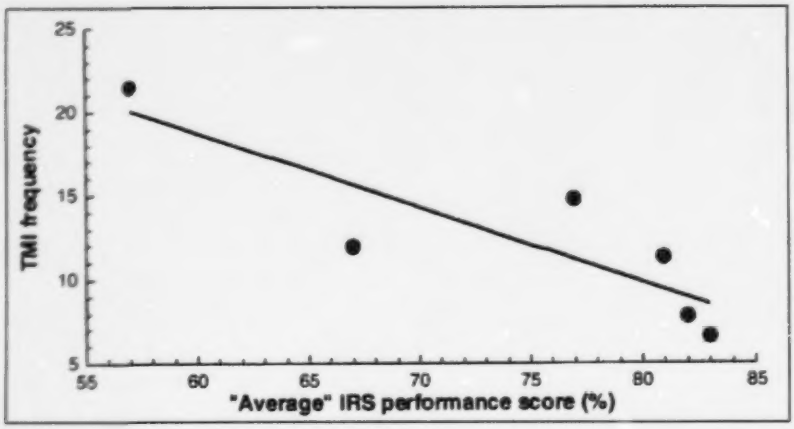


FIGURE B: *The Relationship Between a Mine's Safety Performance and Its Average IRS Performance Score*



IRS Performance Indicators

Many of the questions were designed to probe the flow of information and responsibility up and down, and within, the responsibility chain. To investigate relationships with safety statistics, we chose the clusters of questions dealing with indicators of IRS performance. These clusters dealt with the nine indicators of IRS performance shown below and involved all levels of the responsibility system.

Beliefs [34] *(Note 11)*	Responsibility [4]	Accountability [8]
H&S concerns & responses [16]	Initiatives & responses [26]	IRS issues & responses [45]
Demonstrating leadership [39]	Work planning [8]	Information flow [6]

To make the comparison with safety records, we arbitrarily took the average of the "scores" of all nine indicators (individual questions were scored in a similar way to those described in the Section above). The result, for the six mines, is shown in Figure B. There is good correlation between the scores for the nine indicators, taken as a whole, and the safety records of the six mines-the higher the score, the lower the TMI frequency.

ANALYSIS OF QUESTIONNAIRES

For analysis purposes we grouped the questions into a series of "clusters", each with the same theme--e.g., questions involving the planning of the work are grouped together in the "planning cluster". Much of the report is concerned with investigating such questions as: "Why did the mines with the best safety performance score high in their responses?" Which questions, or clusters of questions contributed the most to a high score, and which did not-and why? It was an exercise that enabled us to make suggestions as to how the audit tool may be improved.

We approached this task from two standpoints. The first looked at the responses in terms of such IRS "concepts" as leadership (at all levels in the organization), work planning, and information flow. The second looked at responses from the perspective of each level in the organization-for example: how did the supervisors as a group do? or the mine managers?. The first was conceptual, while the second was more structural.

The exercise essentially consisted of an examination of the various clusters on a question by question basis. Such detailed work is virtually impossible to succinctly summarize except in the form of recommendations, and these form part of the final chapter of the report. Accordingly, we suggest that readers of this synopsis investigate the details presented in Chapters 4 and 5 to clarify, for themselves, the reasons for the report's recommendations.

IRS Performance Indicators

As a general observation, there did appear to be a relationship between the preponderance of questions directed to workers and the degree of correlation between IRS performance and the medical aid statistics. There may be several reasons for this. In part, the larger numbers of worker respondents helps. But the reason may have more to do with how abstractions have to filter down and be translated into concrete improvements in conditions and practices in order to reduce risk. It is workers who can see best if policies, systems, leadership activities and so on are being put into practice. Conversely, it might be said that the more senior people are usually quite aware of what the "correct" answers should be to "system oriented questions". The enthusiasm of senior people to "look good" on the survey may have influenced results, giving a more homogeneous response across mines regardless of OHS performance.

The Planning Cluster: There were only eight questions in this cluster. Of these, three were directed to workers and three to front-line supervisors (FLSs). Thus there was a strong emphasis on the views of the people closest to the work. This cluster of questions had a good correlation with OHS performance. The workplaces in which workers and supervisors were involved heavily in planning the work tended to be the mines where there were fewer accidents (as measured by medical aid cases).

The Information Cluster: There were only 6 questions in this cluster and only one of them was directed to workers. However, the answers to this cluster, taken as a whole, correlated reasonably with OHS performance. Workplaces where people doing the work get good OHS information quickly are going to be workplaces where people making daily, practical decisions about work and OHS will be making excellent decisions about risk reduction. It has always been said about the IRS that one of its most basic principles is openness about OHS. In law, this has been referred to as the "right to know", more accurately described as various "duties to tell" on the part of the employer and supervisors. In general, we can say that people are making better decisions throughout the IRS if they have the right information about hazards and controls. Information is the "lubricant" for successful problem-solving in the system.

The "Beliefs" Cluster: There were 34 questions in this relatively large cluster and, taken as a whole, the answers gave a reasonable correlation with OHS performance. The questions were distributed among all workplace parties, with a slight emphasis on workers and supervisors, and covered the following topics:

1. whether a person believed he or she could go to the next level in the IRS without fear of a bad reaction;
2. whether a person believed in a fundamental conflict between OHS and production or profitability;
3. whether a person believed that OHS was a part of quality management;
4. whether a person believed that following procedures is in conflict with production;
5. whether a person viewed OHS goals as being beyond "mere regulatory compliance"; and
6. whether a person believed the role of the JHSC to be one of "internal auditor".

While there are problems reliably measuring beliefs, and while there are debates as to the relative importance of beliefs and behaviours, we assume here that good indicators of the effectiveness of the IRS will be the presence of certain fundamental ideas in the minds of individuals in the workplace. In general, we can say that there was usually good variation within the worker responses, variation that followed the OHS performance of the mine. Questions that required self-assessment by supervisors and managers usually resulted in relatively homogeneous (and positive, from the standpoint of actions by the respondents) responses across mines, thus contributing little to the correlation of the cluster with OHS performance.

The "H&S Concerns & Responses" Cluster: There were 16 questions in this cluster and they dealt with the way people interacted between levels in the organization with respect to handling OHS concerns and complaints. And six of these focussed on the interaction between the worker and the direct supervisor. Taken as a whole, the responses to this cluster showed only a fair correlation with OHS performance. There tended to be a fairly homogeneous and positive response on questions dealing with self-reporting by managers and, hence, there was no correlation with the answers to this sub-set of questions and OHS performance.

We expect the central core of the IRS to be a "filtering mechanism" so that many small issues can be dealt with quickly by workers and front-line supervisors. But issues involving greater resources or having cross-organizational impact will be the larger issues that need to move up the organization. Few reach the top. The many small issues will tend to be direct causes of accidents and exposures. The few large issues will tend to be the system errors that are the root causes of the direct causes.

The "Initiatives & Responses" Cluster: There were 26 questions in this cluster. Only three were directed to workers, and five to front-line supervisors. Middle managers were emphasized with seven questions directed to them. There was no real correlation between the answers, taken as a whole, and OHS performance.

We asked a lot of questions about people taking initiative on OHS in this cluster. The "concerns" cluster, above, was about traditional concerns, reports and complaints. That is, traditionally, people see problems-defects, contraventions, dangers-and they deal with the problem or bring it to someone else. But the quality approach tells us that we want people to go beyond the negative and the traditional. We want people to think of ways of improving the processes they are involved with.

The "Accountability" Cluster: There were eight questions aimed at all levels of the direct line of responsibility except the workers. Although one might have expected a strong correlation between OHS performance and the degree to which people in the IRS were formally held accountable for OHS activities, the answers to the this cluster, either taken singly or as a whole, did not track OHS performance.

The "Demonstrating Leadership" Cluster: This cluster did not correlate with OHS performance. On the face of it, this runs counter to the accepted wisdom that OHS success depends on commitment from the top. Our view is that leadership at all levels is important, but it is up to the more senior people in particular to set the tone, establish the corporate culture and drive the IRS. There were 39 questions in this cluster, but only two of these were directed to workers.

The "IRS Issues & Responses" Cluster: This cluster did not show a correlation with OHS performance. This was the biggest cluster of questions-45 in total. Only two of those questions were directed to workers (i.e., 4% of the questions). This is likely the primary explanation for the poor correlation.

There were several sub-themes in this cluster:

- reporting up the responsibility chain regarding IRS performance;
- responding to such reports;
- the role of the JHSC and worker representative regarding the IRS;
- the role of the OHS professional regarding the IRS;
- the use of "IRS analysis"; and
- the existence of a "truncated" version of the IRS.

Given its size and its sub-themes, this cluster would be better broken out into separate clusters.

The "Responsibility" Cluster: This cluster consisted of only four questions and dealt with responsibility at the worker/front-line supervisor interface, and was disappointing in an ironic way. Who would have thought that the *responsibility* cluster concerning the Internal *Responsibility* System would show a lack of correlation with OHS performance? All we can say is that there were few questions involved in this cluster and so it had little scope and impact.

Analysis of the IRS at All Levels of the Organization

In analyzing the "structural" aspects of the IRS, we had two fundamental questions for each group in the IRS. First, does the group understand the IRS? Second, is the group committed to doing what's necessary under the IRS? Leadership is not something that just the most senior people should be doing. In health and safety we talk about leadership at all levels.

Corporate Level: Six questions were in the cluster asking about senior-executive understanding of the IRS, and seven in the cluster asking about Directors' understanding. *(Note 12)* At this highest level of the IRS we did not find correlation between the answers given (either considered as a whole, or as individual answers) and OHS performance. So, a good score or a bad score doesn't tell us anything since neither are connected to OHS performance. We tended to get the same good answers regardless of whether the mine in question had a good or bad track record on accidents.

The corporate commitment (leadership) cluster-which contained 56 questions in total--consisted of questions for both executives *and* Directors, and questions about executives and Directors asked of other members of the IRS. There was no significant correlation between responses to the cluster, taken as a whole, and OHS performance of the mine. Part of this lack of correlation *may* have been due to the fact that there was considerable homogeneity in the responses from the corporate respondents, irrespective of the mine they were responding about.

Mine Managers: The responses to questions regarding mine managers' understanding of the IRS (a cluster of eight questions) showed some correlation with OHS performance. However, the responses to questions regarding mine managers' commitment to the IRS (36 questions) showed no correlation with OHS performance. Part of the problem may that there was considerable homogeneity in the answers given by the mine managers, irrespective of the mine, and their questions formed nearly half of the questions that made up this cluster. The manager's position in the central core of the IRS is between the middle managers and the executives. There were six questions that asked middle managers about their interaction with the manager. And there were three questions asking senior executives about the manager's performance. The managers themselves had 16 questions that essentially asked them to assess their own performance. Only one question in this cluster was directed to workers and only one was directed to front-line supervisors.

Middle Managers: The middle-manager understanding cluster (seven questions in all) did not show correlation with OHS performance. There was, however, only one corroborative question and that was asked of front-line supervisors. There were 18 questions in the cluster asking about middle managers' commitment to the IRS. Half of the questions were asked directly of the middle managers. Seven questions were asked of the middle managers' immediate subordinates (the front-line supervisors), and mine managers were asked two questions about their immediate subordinates (i.e., the middle managers). Workers, the internal auditors, and the most senior people were not asked anything about the middle managers. The responses to this cluster, taken as a whole, did not correlate with OHS performance--again, probably, because there was fair amount of homogeneity in the responses given by middle managers, irrespective of the mine.

Front-line Supervisors: There were six questions in the cluster dealing with front-line supervisors' understanding of the IRS, and four were asked of the supervisors themselves. The responses to the questions, taken as a whole, correlated with OHS performance. The cluster dealing with the "leadership" of front-line supervisors in the IRS comprised 21 questions, with eight questions being directed at the front-line supervisors themselves and 10 to workers, the remainder were directed to the front-line supervisors' own supervisors or to the "internal auditors". The responses to the questions in this front-line-supervisor cluster, taken as a whole, also correlated with OHS performance.

Workers: There were eight questions that comprised the cluster of questions that dealt with the understanding workers had of the IRS. Four of these were questions asked of the workers themselves, and four asked other levels of the IRS for their assessment of the workers' understanding. There was a good correlation between workers' understanding of the IRS (as measured by this eight question cluster) and whether the mine was a good OHS performer. The cluster dealing with worker commitment and leadership (a small group of only four questions) were not correlated with OHS performance. There were too few of them. In fact, there was only one question aimed directly at workers.

JHSC Members: The cluster investigating JHSC members' understanding of the IRS comprised 12 questions, all but two of which were asked of Committee co-chairs and certified members themselves. There was moderate correlation between the answers from this cluster, considered as a whole, and OHS performance. There are 19 questions in the cluster dealing with JHSC commitment in the IRS, 11 of

which were asked of the co-chairs and/or certified members themselves. There was no significant correlation between the responses to these questions, taken as a whole, and OHS performance.

OHS Co-ordinator: Of the nine questions investigating the OHS co-ordinators' understanding of the IRS, eight were asked of the OHS co-ordinators themselves. There was no correlation between responses and OHS performance. Perhaps OHS co-ordinators have a pretty good idea of what the right answers should be, regardless of the mine they work for. OHS co-ordinators are few in number and they do not normally have direct authority over others regarding OHS. Their understanding of the IRS could only have an impact on a mine's OHS performance if they have influence on the mine manager's and the supervisory personnel's understanding of the IRS. The cluster dealing with the OHS co-ordinator's commitment to the IRS consisted of seven questions; only two were corroborative, and none was aimed at workers or front-line supervisors. There was no correlation between responses to the questions, taken as a whole, and OHS performance.

MOL Inspectors: There was no correlation between the inspectors' questions and OHS performance of the mines they were personally involved with. And, realistically, we would not expect there to be a correlation. The inspector's commitment should be consistent across workplaces, regardless of the OHS performance of the site.

CONCLUSIONS AND RECOMMENDATIONS

The data clearly demonstrate that answers to the questionnaires can be related to a mine's safety performance. The Question 1A and 1B combination, particularly as answered by mine workers, shows promise as an easily administered and interpreted tool that can give a quick assessment of the IRS at a particular mine.

In addition, if it is accepted that the questionnaires do provide a measure of how the IRS functions in the mine (and we have no reason to suspect that they do not), then one can conclude from the correlations that better performance in the IRS will lead to a better safety record. If the IRS is working well, the organization has fewer accidents, as measured by medical aids (and to a lesser degree, as measured by lost time).

Further Modifications of the Audit Tool

The time constraints for this project do not allow us the opportunity for another iteration of testing the audit tool. We do, however, suggest that this be done. In our question by question analysis of the trial audit questionnaires, we gained an impression of which questions appeared to work, and those that did not. We believe that the following types of modifications would give a better overall correlation with OHS performance, as well as improve the correlation of sub-groups and even individual questions.

- Elimination of questions that tended to cause confusion
- Decrease in the number of questions directed to senior management
- Increase in questions to non-senior management about the beliefs and actions of senior management
- Elimination of questions that had little contribution to the correlation with OHS performance
- Change in wording of some questions so as to be more specific or more action oriented
- Re-classification of a small number of questions in the thematic clusters of questions used to focus in on the causes of IRS performance
- A change in the number and nature of the thematic clusters of questions The IRS Description

The description of the IRS is useful in and of itself. A single, authoritative description will reduce misunderstandings about the IRS. Too often in the past one got the sense that people were discussing the IRS while assuming that there was a shared understanding. We are better able to strengthen the IRS when there is a consistency of understanding. To be a little more forceful about it, the description of the IRS, reached as it was with the assistance of the IRS Steering Committee, is perhaps the most important outcome of this project.

The IRS Analysis

There is an outcome of this project that is conceptually part way between the IRS description and the IRS audit tool. That is, the IRS model can be used to analyze OHS situations, problems and opportunities in new ways. Most health and safety problems can be analyzed in terms of the root problems with the "people factors" in the organization. We call this "IRS analysis".

- IRS analysis puts the people of the organization front and centre in the analysis.
- Everyone should be engaged in IRS analysis to some degree. The health of the IRS itself should be a major concern of mid to senior management. The manager should be asking him or herself: "What authority or resources did they lack that they felt that they could not solve this problem?" and "If there was a lack of information, authority or resources, why was the problem not passed on up to a higher level of the organization?"
- The OHS professional and the JHSC members would do a much better job of handling issues if they became accustomed to thinking in IRS terms. IRS analysis would take us beyond the question "is this work safe?", to "why wasn't this hazard dealt with by the people responsible within the day to day routine?"
- Similarly, while we made no direct observations, it follows that a MOL inspector has greater success in obtaining compliance if he or she goes beyond compliance into the IRS. It is not that people would be prosecuted or be given orders expressly for "failures within the IRS", but rather IRS analysis would locate individuals needing external stimulation or stimulation from the higher levels of the IRS.

The IRS Audit

We have shown very strong support for the principle that if the IRS is working well an organization will have fewer accidents. The IRS audit is a tool for measuring how well the IRS is working. But the IRS audit does more than that. It also enables the user to find out *why* the IRS is working the way it is, and thus provides some guidance as to what actions might be taken to improve the IRS.

It should be noted that the predictive value of the audit tool works even if there is no actual use of the tool. All one needs to do is identify the organizations with poor medical aid and lost time statistics and you have identified the organizations with weak IRS performance. There is a temptation to say that this is merely stating the obvious, but it must be recalled that this study showed the relationship between the "end of stream" statistics and IRS performance. The statistics predict which organizations need the more intense analysis based on the full set of questions--the analysis focussing on why the IRS is performing poorly.

It is vital that users of the audit tool do not rest with the final "scores", but use the tool to probe deep into the organization to see why the numbers turned out the way they did. This analysis is the most important use of the audit tool, particularly for the people within the workplace.

The main report makes a whole series of observations and comments regarding the administration of the audit tool. The following topics are covered:

- Proper modification of the audit tool;
- The need for a single official custodian of the audit tool;
- Tinkering with analysis algorithms contained in an Excel spreadsheet, the electronic version of which formed part of the report;
- Distribution of questions or model answers;
- How to refresh the questions;
- Time taken to administer the Audit;
- Audit Frequency;
- Using the audit results;
- Evidence for answers;
- Fear of a Poor "Score";
- Sampling Strategy;

- The cost factor
- Ensuring that groups of respondents are matched;
- Ensuring that all shifts are sampled;
- Education and training for consistency of use;
- Internal auditors;
- External auditors; and
- Following-up on the Audits.

This list is not intended to be exhaustive, but rather serves to illustrate many of the considerations that will need to be addressed before an audit tool is put into general use.

Postscript

The IRS Steering Committee reviewed the report in its "draft-final" form and discussed its contents and recommendations with us at a meeting on 18 August 2000. Subsequent to that meeting, and based on our recommendations on how the questionnaires might be improved, the committee asked us to make revisions to the questionnaires administered during the trial audit of the six mines. This was done, and revised questionnaires are appended to the main report. However, the Committee did not adopt all the recommendations we made for questionnaire change. Further, while we feel that the limited changes should lead to questionnaires that produce responses giving a better overall correlation with OHS performance, there is no way (short of conducting additional mine audits) of verifying this. This is because of the new questions that have been added.

The report spent considerable effort in analyzing, on a question by question basis, the questionnaires. This analysis showed that there were problems in both the way some of the trial-audit questions were asked, and how they were grouped and weighted to analyze IRS functions. We feel that a more focussed analysis of the considerable wealth of data collected in the trial audit, than was permitted by the time and resources available to us in this project, would considerably improve the audit tool as it now stands. Thus we caution that, while the Excel spreadsheet (which, in its electronic form, is part of this report) was useful in helping the analyses reported here, there are problems in the underlying algorithms. Accordingly, if the spreadsheet is used at all in its present form, its results need to be treated with due circumspection.

Notes

Note 1 The two earlier reports were: I.M. Plummer, P.W. Strahlendorf, and M.G. Holliday, THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES-Interim Report #1: Description of the IRS (delivered to the IRS Steering Committee, 30 November 1999); and, I.M. Plummer, P.W. Strahlendorf, and M.G. Holliday, THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES-Interim Report #2: The Pilot Audit (delivered to the IRS Steering Committee, 7 February 2000).
Return to text

Note 2 An earlier version of the audit tool was tested at two mines (also selected by the IRS Steering Committee)-Craig Mine, Onaping; Campbell Mine, Red Lake-in the pilot phase of the project. The experience gained led to modifications in the questionnaires that were then administered in the trial audit.
Return to text

Note 3 These include the Health and Safety Co-ordinator; Hygienist; and Nurse, etc.
Return to text

Note 4 The members of the Union, and their representatives who are employees of the employer are "internal" to the employer's organization. The Union will also have health and safety resources located "external" to the employer's organization.
Return to text

Note 5 Although these parties are contributive to the IRS in the workplace in general, they are also direct parties to the IRS in their own workplaces.
Return to text

Note 6 See Note 4
Return to text

Note 7 We also looked at lost-time injury (LTI) frequency. But, because LTIs are of considerably smaller magnitude than TMIs, correlations with questionnaire responses were not as obvious.

Return to text

Note 8 SCORE: Each individual's understanding of the IRS was scored by assigning 12.5% to each of a, c, d, f, h, k, l, and m and -20% to each of b, e, g, i, and j, and adding the result. Thus respondents would score 100% if they ticked a, c, d, f, h, k, l, and m, but no others, and 0% if they ticked all 13 alternatives or if they ticked none at all (-100% would be achieved if b, e, g, i, and j, but no others were ticked). In cases where there were negative scores, we assigned 0%.
Return to text

Note 9 SCORE: We assigned 0% to "strongly disagree". 33% to "somewhat disagree", 67% to "somewhat agree", and 100% to "strongly agree".
Return to text

Note 10 The least-squares linear-regression line shown in Figure A, is significant (as measured by the Student's t test) at the 1% level ($p = <0.01$)-in other words, such a line would be likely to occur by chance only one time out of a hundred.
Return to text

Note 11 The figures in brackets indicate the number of questions in each suite.
Return to text

Note 12 For two of the six mines, we were unable to include Directors in the survey.
Return to text

Related Documents: News Release
Backgrounder
Fact Sheet
Excerpts of the Internal Responsibility System in Ontario Mines *(Version 4.0)*

Return to: Announcements Calendar
Occupational Health and Safety

| central site | feedback | search | site map | français |

Last Modified: Friday, December 22, 2000

This information is provided as a public service by the Government of Ontario. Every reasonable effort has been made to ensure the currency and accuracy of the information presented at the site, but readers should verify information before acting on it.

Ontario
This site maintained by the Government of Ontario, Canada

Copyright information: © Queen's Printer for Ontario, 2000

EXCERPTS FROM:

THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES

Final Report: The Trial Audit & Recommendations

Ian M. Plummer
Peter W. Strahlendorf
Michael G. Holliday

31 July 2000
(revised 21 September 2000)

(revised by Steering Committee 23 October 2000)

ACKNOWLEDGEMENTS

First we would like to thank the hundreds of individuals who completed questionnaires, agreed to be interviewed, provided us with information, and who generally ensured that our visits to the mines participating in this study went so smoothly. Without their help, their candour, and their efforts on our behalf, this study would not have been possible. Second, we acknowledge with gratitude the help and guidance, and yes, on occasion, candour of the IRS Steering Committee:

Candys Ballanger-Michaud	Director Northern Region, Ministry of Labour
George Botic	National Health & Safety Representative, Canadian Auto Workers/Mine Mill
Bernie Deck	Provincial Mining Co-ordinator, Ministry of Labour
Ric deMeulles	General Manager, Mining and Aggregates Safety and Health Association
Warren Holmes	Senior Vice-President, Canadian Mine Operations, Falconbridge Ltd.
Nancy Hutchison	Co-ordinator, Health & Safety and Technical Services, United Steelworkers of America
Fergus Kerr	Director of Mining Sector, Workplace Safety and Insurance Board
Don McGraw	Chair, Safety and Health, United Steelworkers of America
Tim Millard (Committee Chair)	former Deputy Minister of the Ministry of Labour
Ron Rafuse	Superintendent of Transportation, Inco Ltd.
Andy Rickaby	Vice-President, Mineral & Environmental Operations, Denison Mines Ltd.
Al Robb	Representative, Communications, Energy and Paper Workers Union
Peter Rowlandson	General Manager, Hemlo Operations, Williams Operating Corporation

Finally, we wish to express our heartfelt appreciation of the superior (not to say, at times, almost superhuman) organizational skills and downright hard work of Kirsty Cummins, Ministry of Labour, for keeping this project on track.

SYNOPSIS

INTRODUCTION

This is the third and final report of a study on the Internal Responsibility System (IRS) in Ontario underground mines.[1] Our main aim has been to develop an audit tool through which the health of the Internal Responsibility System in a mine can be assessed. This report describes the validated audit tool, as a result of its being tested in a trial audit on six mines, and contains suggestions for further improvement of the tool and for its administration by others.

The study has been conducted with the oversight of the IRS Steering Committee consisting of government, industry and labour representatives. This committee selected the six mines at which to test the trial audit tool—four hardrock mines (two gold mines and two base-metal mines) and two soft-rock mines:[2]

Falconbridge Ltd. Kidd Creek Mine Timmins	Inco Ltd. Creighton Mine Copper Cliff	Georgia Pacific Corp. Caledonia Mine Caledonia
Sifto Canada Inc. Goderich Mine Goderich	Placer Dome Canada Ltd. Musselwhite Mine Thunder Bay	Teck-Corona Operating Corp. David Bell Mine Marathon

These mines were not a random sample of Ontario underground mines but were chosen so as to provide a broad range of both mine types and health and safety performance. In addition, the Steering Committee selected two mining-contractor operations to which the audit tool was to be administered, with the primary purpose of investigating the IRS interface between mine and contractor employees. The visits took place from the end of February to the beginning of April 2000.

---

1 The two earlier reports were: I.M. Plummer, P.W. Strahlendorf, and M.G. Holliday, *THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES—Interim Report #1: Description of the IRS* (delivered to the IRS Steering Committee, 30 November 1999); and, I.M. Plummer, P.W. Strahlendorf, and M.G. Holliday, *THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES—Interim Report #2: The Pilot Audit* (delivered to the IRS Steering Committee, 7 February 2000).

2 An earlier version of the audit tool was tested at two mines (also selected by the IRS Steering Committee)—Craig Mine, Onaping; Campbell Mine, Red Lake—in the pilot phase of the project. The experience gained led to modifications in the questionnaires that were then administered in the trial audit.

THE INTERNAL RESPONSIBILITY SYSTEM (IRS)

With the assistance of the IRS Steering Committee we produced a description of the Internal Responsibility System. The roles and responsibilities of the contributors to the IRS, as well as a number of processes important for a successful IRS, are all set out in this description. The model of the IRS we developed is consistent with previous descriptions in the Ham and Burkett Reports. The questionnaires administered in the trial audit and our interpretation of the responses were based on the description.

Description of the IRS

The IRS is a system, within an organization, where everyone has *direct* responsibility for health and safety as an essential part of his or her job. It does not matter who or where the person is in the organization, they achieve health and safety in a way that suits the kind of work they do. Each person takes initiative on health and safety issues and works to solve problems and make improvements on an on-going basis. They do this both singly and co-operatively with others. It is one of the *personal* responsibilities of a company President to ensure that the entire system of direct responsibility for health and safety within a company is established, promoted and improved over time. Successful implementation of the IRS should result in progressively longer intervals between accidents or work-related illnesses.

In addition to those with *direct* responsibility, a number of people and agencies have *contributive* responsibility for health and safety. Within any organization, the Joint Health and Safety Committee (JHSC) has a key contributive part:

- in health and safety in general, and
- in making the IRS work well.

The organization's health and safety staff[3] also play a *contributive* role.

Assisting the IRS from *outside* the organization are the Safe Workplace Associations (e.g. MASHA), the Ministry of Labour (MOL), Unions[4] and others. The MOL may exercise direct authority to resolve health and safety problems in the

---

3 These include the Health and Safety Co-ordinator; Hygienist; and Nurse, etc.

4 The members of the Union, and their representatives who are employees of the employer are "internal" to the employer's organization. The Union will also have health and safety resources located "external" to the employer's organization.

workplace, principally through its inspectors issuing orders. Listed in Table A are the direct and contributive components.

Keys to a Successful IRS

1. Everyone must have a sincere wish to prevent accidents and illnesses;
2. Everyone must accept that accidents and illnesses have causes that can be eliminated or greatly reduced;
3. Everyone must accept that risk can be continually reduced, so that the time between accidents and illnesses get longer and longer;
4. Everyone must accept that health and safety is an essential part of doing his or her work (health and safety is not an extra, it is part of doing the job);
5. Every person must have a clear understanding of what he/she is responsible for; what he/she can do to change matters; and when things must be done;
6. Every person must be regularly asked to explain what they have done to ensure health and safety on the job and in the workplace;
7. Everyone must have a clear understanding of their own skill, ability and limitations, and should have the capacity to carry out their responsibilities;
8. Everyone must attempt to avoid conflict when trying to reduce risk;
9. As an individual, each person must go beyond just complying with health and safety rules and standards, and strive to improve work processes to reduce risk;
10. When an individual cannot reduce risk by him/herself, then they must cooperate with others to go beyond just complying with health and safety rules and standards, and strive to improve work processes to reduce risk;
11. Everyone must understand the IRS process, believe in it, and take steps to make it effective at all levels in the organization; and
12. No one should be fearful of reprisals when using IRS processes.

AUDIT APPROACH

The audit tool consisted of four major components:

- administration of questionnaires to individuals that represent each level of responsibility associated with the IRS;
- follow-up interviews with a representative sample of questionnaire respondents;
- observation and discussion of the situation in the workplace; and
- documentation selected by the mine's JHSC to provide examples of how their IRS was being implemented.

TABLE A: *Participants with Direct Responsibility in the IRS and Those with a Contributive Role*

PARTICIPANTS IN INTERNAL RESPONSIBILITY SYSTEM	
Direct Participants	**Contributive Participants**
Members of Board of Directors	INTERNAL
Executives	Joint Health and Safety Committee
Managers	Health and Safety Staff[5]
Supervisors	Engineers[5]
Workers	Other Staff[5]
	Union(s)[6]
	EXTERNAL
	Union(s)[6]
	Safe Workplace Association
	Workers' Centre
	Ministry of Labour
	WSIB
	Suppliers

There were 10 different questionnaires—for six levels of direct responsibility and for four levels of contributive responsibility:

Direct Responsibility	Contributive Responsibility
Company Directors	Co-chairs of the JHSC
Senior Executive Officers	Certified Members
Mine Managers	OHS Specialist
Senior Supervisors	Ministry Inspectors
Front-line Supervisors	
Workers	

Each questionnaire consisted of some 30 to 40 questions. With the exception of the first question (which was in multiple-choice format), there were two types of questions. One type asked whether the respondent "strongly disagreed", somewhat disagreed", somewhat agreed", or "strongly agreed" with a statement concerning an aspect of the IRS as it

---

5 Although these parties are *contributive* to the IRS in the workplace in general, they are also *direct* parties to the IRS in their own workplaces.

6 See Footnote 4

applied to the respondent's work. The other type of question asked for direct information in the form of "Yes/No" answers.

At each mine, we administered questionnaires to about 25 workers (the numbers varied between 14 and 27), five front-line supervisors (the numbers varied between 3 and 7), three middle managers (the numbers varied between 0 and 5), the mine manager, the two JHSC co-chairs and two certified members, and the health and safety co-ordinator. At each site, we conducted follow-up interviews with about one third of the workers and front-line supervisors, about half the middle managers and JHSC members, and the mine manager and the health and safety co-ordinator. We also informally interviewed workers as we took a tour of the underground mine. In addition, we asked each mine to provide us with documentary evidence that they felt would serve to illustrate functioning of the IRS at the site. Off site, we administered questionnaires to the MOL inspector(s) responsible for the mine, and attempted also to administer questionnaires to two senior executives and a company Director for each mine, and conducted follow-up interviews with all who answered the questionnaires. The numbers of questionnaires administered and interviews carried out are presented in Table B.

AUDIT VALIDATION

To validate the audit tool, we compared responses to groups of questions with the safety record of the mine. The safety statistic we primarily used of this comparison was total medical injury (TMI) frequency.[7] In order to make the comparison meaningful, we needed to calculate frequencies over a reasonably long period. Because the safety statistics of one of the six mines only started in 1997, we used the period 1997 to April 2000.

Complete analysis of the vast amount of data collected from the six mines visited in the trial audit would have taken many months more than the time and resources available to this project. Accordingly, in the validation, we chose to concentrate on two facets of the data contained in the questionnaires. One involved a question that probed what respondents believed the IRS ***should be***, and the other looked at groups of questions that have a bearing on various aspects of actual IRS performance.

---

[7] We also looked at lost-time injury (LTI) frequency. But, because LTIs are of considerably smaller magnitude than TMIs, correlations with questionnaire responses were not as obvious.

TABLE B: *Tally of Questionnaires Answered and Follow-up Interviews Conducted During the Trial Audit*

	QUESTIONNAIRES ANSWERED	FOLLOW-UP INTERVIEWS
COMPANY DIRECTOR	4	4
SENIOR OFFICERS	10	9
MINE MANAGERS	8	8
MIDDLE MANAGERS	19	13
FRONT-LINE SUPERVISORS	34	18
WORKERS	151	56
CO-CHAIRS	11	8
CERTIFIED MEMBERS	15	13
H&S CO-ORDINATORS	7	7
INSPECTORS	8	8
TOTALS	**267**	**144**

Individual Perception of the IRS

The first question (Question 1a) on every questionnaire was a multiple-choice question and consisted of 13 separate statements. It asked respondents about what they thought the IRS ***should be***, and was administered to all levels in the responsibility system. Because the same question was asked of everybody, the responses give a very good overview of the current understanding of the IRS at the mines—see Table C.

The overall understanding of the IRS at the mines involved in the trial audit, using the scoring scheme in the footnote below,[8] stood at 70 percent. In general, understanding improves as one moves up the line of direct responsibility within the mine site. Mine workers, as a group, show the lowest level of understanding and mine managers show the highest; understanding decreased somewhat at the corporate level. The health and safety component (JHSC members and health and safety co-ordinators) also showed high levels of understanding. Similar distributions in understanding were also seen when the mines were looked at on an individual basis.

The success of this multiple-choice question in giving a "snapshot" of the level of understanding of the IRS at a mine site became apparent to us early in the trial audit visits. And, because of this, we took the opportunity to combine the multiple-choice question with a supplementary question asking the respondents for an assessment of how the IRS was actually working at their workplace. In this question, respondents were asked to say whether they "strongly disagreed", somewhat disagreed", somewhat agreed", or "strongly agreed" with the following statement: "Given my answer to the Question 1a, I believe the IRS is working effectively in my workplace".[9] This supplementary question (Question 1b) was used at four of the six mines.

---

[8] SCORE: Each individual's understanding of the IRS was scored by assigning 12.5% to each of **a**, **c**, **d**, **f**, **h**, **k**, **l**, and **m** and –20% to each of **b**, **e**, **g**, **i**, and **j**, and adding the result. Thus respondents would score 100% if they ticked **a**, **c**, **d**, **f**, **h**, **k**, **l**, and **m**, but no others, and 0% if they ticked all 13 alternatives or if they ticked none at all (–100% would be achieved if **b**, **e**, **g**, **i**, and **j**, but no others were ticked). In cases where there were negative scores, we assigned 0%.

[9] SCORE: We assigned 0% to "strongly disagree". 33% to "somewhat disagree", 67% to "somewhat agree", and 100% to "strongly agree".

TABLE C: *Summary of Answers to Question 1a as Percentages*

"I believe that the Internal Responsibility System (IRS) **should be** where:	Wkr n=151	FLS n=34	MM n=19	Mgr n=8	Exec n=10	Dir n=4	JHSC n=26	HSC n=7	Insp n=8	Avg. n=267
a) everyone (from the rockface to the Boardroom) looks after health and safety as part of doing their job;	88	91	100	100	100	100	100	100	100	**92**
b) the workers are the only ones to look after their own and co-worker safety;	11	6	0	0	0	0	0	0	13	**7**
c) the supervisors and managers co-operate with the workers to head off and solve problems;	71	94	95	100	80	100	96	100	100	**81**
d) we all work together to make things better by reducing or eliminating the health and safety risks;	81	97	95	100	100	100	96	100	88	**88**
e) the Health and Safety Committee is directly responsible to make the workplace safe;	24	15	11	13	20	50	19	0	25	**21**
f) the Company President has some responsibility for the worker's health and safety;	67	79	79	100	100	100	81	86	78	**75**
g) the supervisor only makes sure the workers follow the rules and procedures;	9	3	0	0	0	0	4	0	0	**6**
h) f the worker cannot fix the problem, the supervisor will help find the answer;	77	91	79	100	80	100	88	86	75	**82**
i) if the worker cannot fix the problem, the only way out is to refuse to work;	11	3	0	0	0	0	0	0	0	**7**
j) the Health and Safety Coordinator finds the problems and tells the workers to fix them;	11	6	0	0	0	0	4	0	0	**7**
k) the Health and Safety Committee are resources;	66	79	79	100	100	100	92	100	88	**75**
l) the Health and Safety Committee help resolve issues when other ways fail;	68	76	89	50	40	25	77	57	88	**70**
m) we go beyond fixing problems and try to improve the health and safety in the work processes."	66	79	84	100	90	100	88	100	88	**75**

"SCORE"	60	80	85	91	82	81	85	91	82	70 %

Working on the assumption that individual respondents' assessments of the IRS in their workplaces (i.e., Question 1b) are of greater validity the higher they scored on the understanding part of the question (i.e., Question 1a), we multiplied each individual's score for 1b by their score for 1a. The resulting product is a measure of the effectiveness of the mine's IRS according to that individual. We looked at the effectiveness of the mine's IRS, as judged by mine-workers' responses to Questions 1a and 1b (mine workers were the only group that really contained enough responses to make a comparison valid), and compared them with that mine's safety record. The result of this comparison is shown in Figure A. There is a remarkably good relationship between the effectiveness of a mine's IRS (as measured by worker responses to Questions 1a and 1b) and its safety performance—the higher the score to the Q1a*Q1b combination, the lower the TMI frequency for the mine is likely to be.[10]

IRS Performance Indicators

Many of the questions were designed to probe the flow of information and responsibility up and down, and within, the responsibility chain. To investigate relationships with safety statistics, we chose the clusters of questions dealing with indicators of IRS performance. These clusters dealt with the nine indicators of IRS performance shown below and involved all levels of the responsibility system.

Beliefs [34][11]	Responsibility [4]	Accountability [8]
H&S concerns & responses [16]	Initiatives & responses [26]	IRS issues & responses [45]
Demonstrating leadership [39]	Work planning [8]	Information flow [6]

To make the comparison with safety records, we arbitrarily took the average of the "scores" of all nine indicators (individual questions were scored in a similar way to those described in the Section above). The result, for the six mines, is shown in Figure B. There is good correlation between the scores for the nine indicators, taken as a whole, and the safety records of the six mines—the higher the score, the lower the TMI frequency.

---

[10] The least-squares linear-regression line shown in Figure A, is significant (as measured by the Student's t test) at the 1% level ($p = <0.01$)—in other words, such a line would be likely to occur by chance ***only*** one time out of a hundred.

[11] The figures in brackets indicate the number of questions in each suite.

FIGURE A: *The Relationship Between a Mine's Safety Performance and the Effectiveness of Its IRS (as measured by workers' responses to Questions 1a and 1b)*

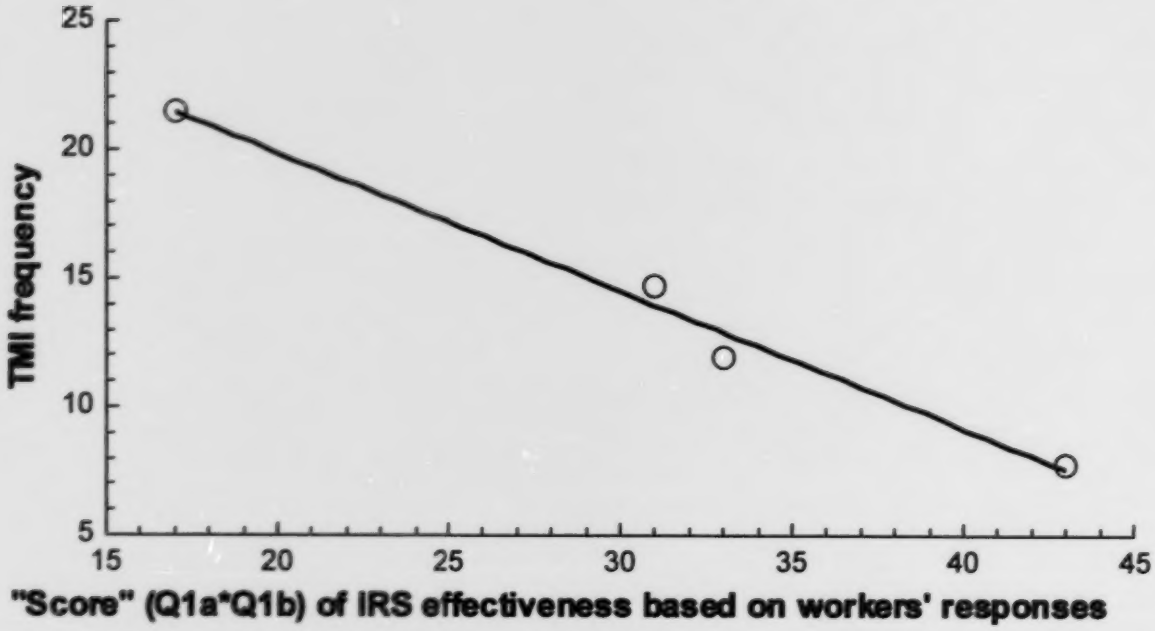
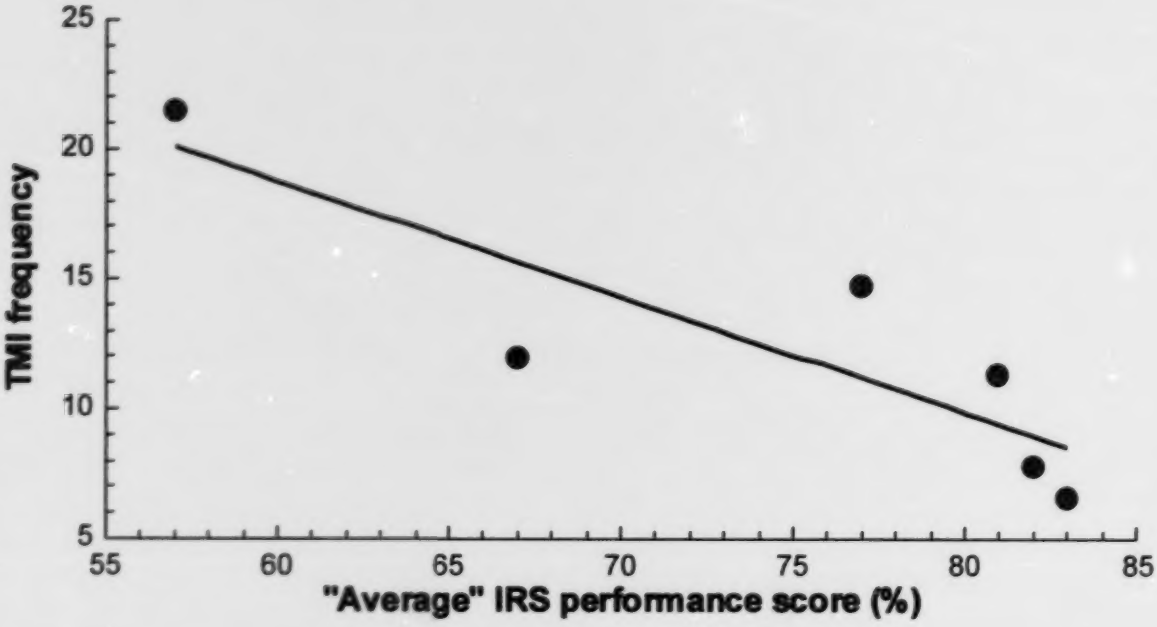


FIGURE B: *The Relationship Between a Mine's Safety Performance and Its Average IRS Performance Score*



Analysis of questionnaires

For analysis purposes we grouped the questions into a series of "clusters", each with the same theme—e.g., questions involving the planning of the work are grouped together in the "planning cluster". Much of the report is concerned with investigating such questions as: "Why did the mines with the best safety performance score high in their responses?" Which questions, or clusters of questions contributed the most to a high score, and which did not—and why? It was an exercise that enabled us to make suggestions as to how the audit tool may be improved.

We approached this task from two standpoints. The first looked at the responses in terms of such IRS "concepts" as leadership (at all levels in the organization), work planning, and information flow. The second looked at responses from the perspective of each level in the organization—for example: how did the supervisors as a group do? or the mine managers?. The first was conceptual, while the second was more structural.

The exercise essentially consisted of an examination of the various clusters on a question by question basis. Such detailed work is virtually impossible to succinctly summarize except in the form of recommendations, and these form part of the final chapter of the report. Accordingly, we suggest that readers of this synopsis investigate the details presented in Chapters 4 and 5 to clarify, for themselves, the reasons for the report's recommendations.

IRS Performance Indicators

As a general observation, there did appear to be a relationship between the preponderance of questions directed to workers and the degree of correlation between IRS performance and the medical aid statistics. There may be several reasons for this. In part, the larger numbers of worker respondents helps. But the reason may have more to do with how abstractions have to filter down and be translated into concrete improvements in conditions and practices in order to reduce risk. It is workers who can see best if policies, systems, leadership activities and so on are being put into practice. Conversely, it might be said that the more senior people are usually quite aware of what the "correct" answers should be to "system oriented questions". The enthusiasm of senior people to "look good" on the survey may have influenced results, giving a more homogeneous response across mines regardless of OHS performance.

The Planning Cluster: There were only eight questions in this cluster. Of these, three were directed to workers and three to front-line supervisors (FLSs). Thus there was a strong emphasis on the views of the people closest to the work. This cluster of questions had a good correlation with OHS performance. The workplaces in which workers and supervisors were involved heavily in planning the work tended to be the mines where there were fewer accidents (as measured by medical aid cases).

The Information Cluster: There were only 6 questions in this cluster and only one of them was directed to workers. However, the answers to this cluster, taken as a whole, correlated reasonably with OHS performance. Workplaces where people doing the work get good OHS information quickly are going to be workplaces where people making daily, practical decisions about work and OHS will be making excellent decisions about risk reduction. It has always been said about the IRS that one of its most basic principles is openness about OHS. In law, this has been referred to as the "right to know", more accurately described as various "duties to tell" on the part of the employer and supervisors. In general, we can say that people are making better decisions throughout the IRS if they have the right information about hazards and controls. Information is the "lubricant" for successful problem-solving in the system.

The "Beliefs" Cluster: There were 34 questions in this relatively large cluster and, taken as a whole, the answers gave a reasonable correlation with OHS performance. The questions were distributed among all workplace parties, with a slight emphasis on workers and supervisors, and covered the following topics:

1. whether a person believed he or she could go to the next level in the IRS without fear of a bad reaction;
2. whether a person believed in a fundamental conflict between OHS and production or profitability;
3. whether a person believed that OHS was a part of quality management;
4. whether a person believed that following procedures is in conflict with production;
5. whether a person viewed OHS goals as being beyond "mere regulatory compliance"; and
6. whether a person believed the role of the JHSC to be one of "internal auditor".

While there are problems reliably measuring beliefs, and while there are debates as to the relative importance of beliefs and behaviours, we assume here that good indicators of the

effectiveness of the IRS will be the presence of certain fundamental ideas in the minds of individuals in the workplace. In general, we can say that there was usually good variation within the worker responses, variation that followed the OHS performance of the mine. Questions that required self-assessment by supervisors and managers usually resulted in relatively homogeneous (and positive, from the standpoint of actions by the respondents) responses across mines, thus contributing little to the correlation of the cluster with OHS performance.

The "H&S Concerns & Responses" Cluster: There were 16 questions in this cluster and they dealt with the way people interacted between levels in the organization with respect to handling OHS concerns and complaints. And six of these focussed on the interaction between the worker and the direct supervisor. Taken as a whole, the responses to this cluster showed only a fair correlation with OHS performance. There tended to be a fairly homogeneous and positive response on questions dealing with self-reporting by managers and, hence, there was no correlation with the answers to this sub-set of questions and OHS performance.

We expect the central core of the IRS to be a "filtering mechanism" so that many small issues can be dealt with quickly by workers and front-line supervisors. But issues involving greater resources or having cross-organizational impact will be the larger issues that need to move up the organization. Few reach the top. The many small issues will tend to be direct causes of accidents and exposures. The few large issues will tend to be the system errors that are the root causes of the direct causes.

The "Initiatives & Responses" Cluster: There were 26 questions in this cluster. Only three were directed to workers, and five to front-line supervisors. Middle managers were emphasized with seven questions directed to them. There was no real correlation between the answers, taken as a whole, and OHS performance.

We asked a lot of questions about people taking initiative on OHS in this cluster. The "concerns" cluster, above, was about *traditional* concerns, reports and complaints. That is, traditionally, people see problems—defects, contraventions, dangers—and they deal with the problem or bring it to someone else. But the quality approach tells us that we want people to go beyond the negative and the traditional. We want people to think of ways of improving the processes they are involved with.

The "Accountability" Cluster: There were eight questions aimed at all levels of the direct line of responsibility except the workers. Although one might have expected a strong correlation between OHS performance and the degree to which people in the IRS were formally held accountable for OHS activities, the answers to the this cluster, either taken singly or as a whole, did not track OHS performance.

The "Demonstrating Leadership" Cluster: This cluster did not correlate with OHS performance. On the face of it, this runs counter to the accepted wisdom that OHS success depends on commitment from the top. Our view is that leadership at all levels is important, but it is up to the more senior people in particular to set the tone, establish the corporate culture and drive the IRS. There were 39 questions in this cluster, but only two of these were directed to workers.

The "IRS Issues & Responses" Cluster: This cluster did not show a correlation with OHS performance. This was the biggest cluster of questions—45 in total. Only two of those questions were directed to workers (i.e., 4% of the questions). This is likely the primary explanation for the poor correlation.

There were several sub-themes in this cluster:

- reporting up the responsibility chain regarding IRS performance;
- responding to such reports;
- the role of the JHSC and worker representative regarding the IRS;
- the role of the OHS professional regarding the IRS;
- the use of "IRS analysis"; and
- the existence of a "truncated" version of the IRS.

Given its size and its sub-themes, this cluster would be better broken out into separate clusters.

The "Responsibility" Cluster: This cluster consisted of only four questions and dealt with responsibility at the worker/front-line supervisor interface, and was disappointing in an ironic way. Who would have thought that the *responsibility* cluster concerning the Internal *Responsibility* System would show a lack of correlation with OHS performance? All we can say is that there were few questions involved in this cluster and so it had little scope and impact.

Analysis of the IRS at All Levels of the Organization

In analyzing the "structural" aspects of the IRS, we had two fundamental questions for each group in the IRS. First, does the group understand the IRS? Second, is the group committed to doing what's necessary under the IRS? Leadership is not something that just the most senior people should be doing. In health and safety we talk about leadership at all levels.

Corporate Level: Six questions were in the cluster asking about senior-executive understanding of the IRS, and seven in the cluster asking about Directors' understanding.[12] At this highest level of the IRS we did not find correlation between the answers given (either considered as a whole, or as individual answers) and OHS performance. So, a good score or a bad score doesn't tell us anything since neither are connected to OHS performance. We tended to get the same good answers regardless of whether the mine in question had a good or bad track record on accidents.

The corporate commitment (leadership) cluster—which contained 56 questions in total—consisted of questions for both executives and Directors, *and* questions about executives and Directors asked of other members of the IRS. There was no significant correlation between responses to the cluster, taken as a whole, and OHS performance of the mine. Part of this lack of correlation *may* have been due to the fact that there was considerable homogeneity in the responses from the corporate respondents, irrespective of the mine they were responding about.

Mine Managers: The responses to questions regarding mine managers' understanding of the IRS (a cluster of eight questions) showed some correlation with OHS performance. However, the responses to questions regarding mine managers' commitment to the IRS (36 questions) showed no correlation with OHS performance. Part of the problem may that there was considerable homogeneity in the answers given by the mine managers, irrespective of the mine, and their questions formed nearly half of the questions that made up this cluster. The manager's position in the central core of the IRS is between the middle managers and the executives. There were six questions that asked middle managers about their interaction with the manager. And there were three questions asking senior executives about the manager's performance. The managers themselves had 16 questions that essentially asked them to assess their own performance. Only one question in this cluster was directed to workers and only one was directed to front-line supervisors.

---

[12] For two of the six mines, we were unable to include Directors in the survey.

Middle Managers: The middle-manager understanding cluster (seven questions in all) did not show correlation with OHS performance. There was, however, only one corroborative question and that was asked of front-line supervisors. There were 18 questions in the cluster asking about middle managers' commitment to the IRS. Half of the questions were asked directly of the middle managers. Seven questions were asked of the middle managers' immediate subordinates (the front-line supervisors), and mine managers were asked two questions about their immediate subordinates (i.e., the middle managers). Workers, the internal auditors, and the most senior people were not asked anything about the middle managers. The responses to this cluster, taken as a whole, did not correlate with OHS performance—again, probably, because there was fair amount of homogeneity in the responses given by middle managers, irrespective of the mine.

Front-line Supervisors: There were six questions in the cluster dealing with front-line supervisors' understanding of the IRS, and four were asked of the supervisors themselves. The responses to the questions, taken as a whole, correlated with OHS performance. The cluster dealing with the "leadership" of front-line supervisors in the IRS comprised 21 questions, with eight questions being directed at the front-line supervisors themselves and 10 to workers, the remainder were directed to the front-line supervisors' own supervisors or to the "internal auditors". The responses to the questions in this front-line-supervisor cluster, taken as a whole, also correlated with OHS performance.

Workers: There were eight questions that comprised the cluster of questions that dealt with the understanding workers had of the IRS. Four of these were questions asked of the workers themselves, and four asked other levels of the IRS for their assessment of the workers' understanding. There was a good correlation between workers' understanding of the IRS (as measured by this eight question cluster) and whether the mine was a good OHS performer. The cluster dealing with worker commitment and leadership (a small group of only four questions) were not correlated with OHS performance. There were too few of them. In fact, there was only one question aimed directly at workers.

JHSC Members: The cluster investigating JHSC members' understanding of the IRS comprised 12 questions, all but two of which were asked of Committee co-chairs and certified members themselves. There was moderate correlation between the answers from this cluster, considered as a whole, and OHS performance. There are 19 questions in the cluster dealing with JHSC commitment in the IRS, 11 of which were asked of the co-

chairs and/or certified members themselves. There was no significant correlation between the responses to these questions, taken as a whole, and OHS performance.

OHS Co-ordinator: Of the nine questions investigating the OHS co-ordinators' understanding of the IRS, eight were asked of the OHS co-ordinators themselves. There was no correlation between responses and OHS performance. Perhaps OHS co-ordinators have a pretty good idea of what the right answers should be, regardless of the mine they work for. OHS co-ordinators are few in number and they do not normally have direct authority over others regarding OHS. Their understanding of the IRS could only have an impact on a mine's OHS performance if they have influence on the mine manager's and the supervisory personnel's understanding of the IRS. The cluster dealing with the OHS co-ordinator's commitment to the IRS consisted of seven questions; only two were corroborative, and none was aimed at workers or front-line supervisors. There was no correlation between responses to the questions, taken as a whole, and OHS performance.

MOL Inspectors: There was no correlation between the inspectors' questions and OHS performance of the mines they were personally involved with. And, realistically, we would not expect there to be a correlation. The inspector's commitment should be consistent across workplaces, regardless of the OHS performance of the site.

CONCLUSIONS AND RECOMMENDATIONS

The data clearly demonstrate that answers to the questionnaires can be related to a mine's safety performance. The Question 1A and 1B combination, particularly as answered by mine workers, shows promise as an easily administered and interpreted tool that can give a quick assessment of the IRS at a particular mine.

In addition, if it is accepted that the questionnaires do provide a measure of how the IRS functions in the mine (and we have no reason to suspect that they do not), then one can conclude from the correlations that better performance in the IRS will lead to a better safety record. If the IRS is working well, the organization has fewer accidents, as measured by medical aids (and to a lesser degree, as measured by lost time).

Further Modifications of the Audit Tool

The time constraints for this project do not allow us the opportunity for another iteration of testing the audit tool. We do, however, suggest that this be done. In our

question by question analysis of the trial audit questionnaires, we gained an impression of which questions appeared to work, and those that did not. We believe that the following types of modifications would give a better overall correlation with OHS performance, as well as improve the correlation of sub-groups and even individual questions.

- Elimination of questions that tended to cause confusion
- Decrease in the number of questions directed to senior management
- Increase in questions to non-senior management about the beliefs and actions of senior management
- Elimination of questions that had little contribution to the correlation with OHS performance
- Change in wording of some questions so as to be more specific or more action oriented
- Re-classification of a small number of questions in the thematic clusters of questions used to focus in on the causes of IRS performance
- A change in the number and nature of the thematic clusters of questions

The IRS Description

The description of the IRS is useful in and of itself. A single, authoritative description will reduce misunderstandings about the IRS. Too often in the past one got the sense that people were discussing the IRS while assuming that there was a shared understanding. We are better able to strengthen the IRS when there is a consistency of understanding. To be a little more forceful about it, the description of the IRS, reached as it was with the assistance of the IRS Steering Committee, is perhaps the most important outcome of this project.

The IRS Analysis

There is an outcome of this project that is conceptually part way between the IRS description and the IRS audit tool. That is, the IRS model can be used to analyze OHS situations, problems and opportunities in new ways. Most health and safety problems can be analyzed in terms of the root problems with the "people factors" in the organization. We call this "IRS analysis".

- IRS analysis puts the people of the organization front and centre in the analysis.
- Everyone should be engaged in IRS analysis to some degree. The health of the IRS itself should be a major concern of mid to senior management. The manager should be asking him or herself: "What authority or resources did they lack that they felt that they could not solve this problem?" and "If there was a lack of information, authority

or resources, why was the problem not passed on up to a higher level of the organization?"

- The OHS professional and the JHSC members would do a much better job of handling issues if they became accustomed to thinking in IRS terms. IRS analysis would take us beyond the question "is this work safe?", to "why wasn't this hazard dealt with by the people responsible within the day to day routine?"
- Similarly, while we made no direct observations, it follows that a MOL inspector has greater success in obtaining compliance if he or she goes beyond compliance into the IRS. It is not that people would be prosecuted or be given orders expressly for "failures within the IRS", but rather IRS analysis would locate individuals needing external stimulation or stimulation from the higher levels of the IRS.

The IRS Audit

We have shown very strong support for the principle that if the IRS is working well an organization will have fewer accidents. The IRS audit is a tool for measuring how well the IRS is working. But the IRS audit does more than that. It also enables the user to find out *why* the IRS is working the way it is, and thus provides some guidance as to what actions might be taken to improve the IRS.

It should be noted that the predictive value of the audit tool works even if there is no actual use of the tool. All one needs to do is identify the organizations with poor medical aid and lost time statistics and you have identified the organizations with weak IRS performance. There is a temptation to say that this is merely stating the obvious, but it must be recalled that this study showed the relationship between the "end of stream" statistics and IRS performance. The statistics predict which organizations need the more intense analysis based on the full set of questions—the analysis focussing on why the IRS is performing poorly.

It is vital that users of the audit tool do not rest with the final "scores", but use the tool to probe deep into the organization to see why the numbers turned out the way they did. This analysis is the most important use of the audit tool, particularly for the people within the workplace.

The main report makes a whole series of observations and comments regarding the administration of the audit tool. The following topics are covered:

- Proper modification of the audit tool;
- The need for a single official custodian of the audit tool;

- Tinkering with analysis algorithms contained in an Excel spreadsheet, the electronic version of which formed part of the report;
- Distribution of questions or model answers;
- How to refresh the questions;
- Time taken to administer the Audit;
- Audit Frequency;
- Using the audit results;
- Evidence for answers;
- Fear of a Poor "Score";
- Sampling Strategy;
- The cost factor
- Ensuring that groups of respondents are matched;
- Ensuring that all shifts are sampled;
- Education and training for consistency of use;
- Internal auditors;
- External auditors; and
- Following-up on the Audits.

This list is not intended to be exhaustive, but rather serves to illustrate many of the considerations that will need to be addressed before an audit tool is put into general use.

Postscript

The IRS Steering Committee reviewed the report in its "draft-final" form and discussed its contents and recommendations with us at a meeting on 18 August 2000. Subsequent to that meeting, and based on our recommendations on how the questionnaires might be improved, the committee asked us to make revisions to the questionnaires administered during the trial audit of the six mines. This was done, and revised questionnaires are appended to the main report. However, the Committee did *not* adopt all the recommendations we made for questionnaire change. Further, while we feel that the limited changes should lead to questionnaires that produce responses giving a better overall correlation with OHS performance, there is no way (short of conducting additional mine audits) of verifying this. This is because of the new questions that have been added.

The report spent considerable effort in analyzing, on a question by question basis, the questionnaires. This analysis showed that there were problems in both the way some of the trial-audit questions were asked, and how they were grouped and weighted to analyze IRS functions. We feel that a more focussed analysis of the considerable wealth of data collected in the trial audit, than was permitted by the time and resources available to us in this project, would considerably improve the audit tool as it now stands. Thus we caution that, while the Excel spreadsheet (which, in its electronic form, is part of this report) was useful in helping the analyses reported here, there are problems in the underlying algorithms. Accordingly, if the spreadsheet is used at all in its present form, its results need to be treated with due circumspection.

1. INTRODUCTION

This is the third and final report of a study on the Internal Responsibility System (IRS) in Ontario underground mines. Our main aim has been to develop an audit tool through which the health of the Internal Responsibility System in a mine can be assessed. This report describes the validated audit tool, as a result of its being tested in a trial audit on six mines, and contains suggestions for further improvement of the tool and for its administration by others.

The study has been conducted with the oversight of the IRS Steering Committee consisting of government, industry and labour representatives. The two Interim Reports submitted to the Steering Committee detailed our initial steps, including the development of a description of the IRS and the application of a trial audit tool to two mines selected by the Steering Committee.[13] The final version of the IRS description, as accepted by the Steering Committee, is presented in Chapter Two.

Some changes were made in the audit questions following the pilot audit. A complete set of audit questionnaires administered in the trial audit is presented in

---

13 The two reports were: I.M. Plummer, P.W. Strahlendorf, and M.G. Holliday, *THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES—Interim Report #1: Description of the IRS* (delivered to the IRS Steering Committee, 30 November 1999); and, I.M. Plummer, P.W. Strahlendorf, and M.G. Holliday, *THE INTERNAL RESPONSIBILITY SYSTEM IN ONTARIO MINES—Interim Report #2: The Pilot Audit* (delivered to the IRS Steering Committee, 7 February 2000).

Appendix 1. The audit tool was used in six mines selected by the Steering Committees—four hardrock mines (two gold mines and two base-metal mines) and two soft-rock mines:

Falconbridge Ltd. Kidd Creek Mine Timmins	Inco Ltd. Creighton Mine Copper Cliff	Georgia Pacific Corp. Caledonia Mine Caledonia
Sifto Canada Inc. Goderich Mine Goderich	Placer Dome Canada Ltd. Musselwhite Mine Thunder Bay	Teck-Corona Operating Corp. David Bell Mine Marathon

These mines were not a random sample of Ontario underground mines but were chosen so as to provide a broad range of both mine types and health and safety performance. In addition, the Steering Committee selected two mining-contractor operations to which the audit tool was to be administered, with the primary purpose of investigating the IRS interface between mine and contractor employees. The contractor operations chosen were BLM Mining Services Inc.'s operation at Creighton Mine and Manroc Developments Inc.'s operation at David Bell Mine. The visits took place from the end of February to the beginning of April 2000.

We have detailed the steps taken to validate the audit instrument in Chapter 3. It was critical to determine whether or not mines which "scored" well on the IRS audit were the mines that also had good OHS performance. The latter was measured by total medical aid cases and by lost time data. The audit tool was, in general terms, validated—the mines with lowest accident statistics tended to have the highest IRS "scores". It must be kept in mind, however, that some questions contributed to the correlation between IRS score and OHS performance, and some did not. We have made suggestions for improving the questions so that a higher proportion of the questions will contribute to the correlation.

Chapters 4 and 5 contain our analysis of the audit questions. We were aiming at three things in these two chapters:

- We wanted to provide further insight into why some questions were included in the audit. That is, we wanted to provide greater understanding of the connection between the IRS model in Chapter 2 and specific questions;
- We went beyond the overall numbers into the suitability of sub-groupings of questions. This will assist prospective users of the audit tool. The most productive use of the audit tool is to dig deep into the organization to find out why the mine scored as it did on the audit, so that improvements to the IRS can be made.

- Our analysis also helped uncover specific questions which could be dropped, reworded or replaced. On occasion it was obvious that certain new questions needed to be asked. Our analysis was the basis for many of the recommendations in Chapter 6.

To be more specific, in Chapter 4 we analyzed the audit results in terms of concepts such as "Initiative", "Planning" and "Accountability". That is, the questions were grouped into "clusters" that would illuminate whether certain concepts vital to the successful functioning of the IRS were alive and well. Some of these "performance factors" contributed to correlation with OHS performance better than others. A number of suggestions for changes were made.

In Chapter 5, we looked at the data in a different way. The questions were regrouped along structural lines, rather than conceptually. That is, how did supervisors as a group do? Did mine managers understand the IRS and did they exhibit leadership in making it work? The prospective user thus can see how the root problems in the IRS can lead to very specific remedies aimed at narrow groups within the organization.

Our conclusions are briefly summarized in Chapter 6. We summarize the ways in which the audit questions can be improved. We describe the benefits of having clarified a single, simple description of the IRS that can be used consistently by many interested parties. Further, we describe what we call "IRS Analysis", which is a method of going beyond the superficial OHS problem to determine the weaknesses in the IRS—the "people problems". Finally, we offer a series of suggestions as to how the IRS audit tool can be administered effectively. There are a number of different ways in which different entities can use the IRS audit tool. It is our hope that serious consideration will be given to treating the audit instrument as a "work in progress"; efforts must be made to continually improve it. Second, we would hope that users do not succumb to a fixation on "scores" and "passing the audit". As we discuss in the report, the primary reason for doing an audit should be to engage in an analysis to find out *why* the numbers turned out as they did, so that precise steps can be made to improve the functioning of the IRS.

We now know that a healthy, well-performing IRS can lead to fewer accidents in the workplace. We now have a method of measuring the performance of the IRS and of analyzing the strengths and weaknesses of a workplace-specific IRS. The workplace parties will have many opportunities to build on these insights.

2. THE INTERNAL RESPONSIBILITY SYSTEM (IRS)

This description of the IRS was initially presented in *Interim Report #2* and formally recognized by the Steering Committee at their meeting on 10 February 2000. As a result of the discussions at that meeting, some minor modifications to the description were suggested. The changes were made and we sent the revised version to the Steering Committee on 16 February 2000.

2.1 DESCRIPTION

The IRS is a system, within an organization, where everyone has *direct* responsibility for health and safety as an essential part of his or her job. It does not matter who or where the person is in the organization, they achieve health and safety in a way that suits the kind of work they do. Each person takes initiative on health and safety issues and works to solve problems and make improvements on an on-going basis. They do this both singly and co-operatively with others. It is one of the *personal* responsibilities of a company President to ensure that the entire system of direct responsibility for health and safety within a company is established, promoted and improved over time. Successful implementation of the IRS should result in progressively longer intervals between accidents or work-related illnesses.

In addition to those with *direct* responsibility, a number of people and agencies have *contributive* responsibility for health and safety. Within any organization, the Joint Health and Safety Committee (JHSC) has a key contributive part:

- in health and safety in general, and
- in making the IRS work well.

The organization's health and safety staff[14] also play a *contributive* role.

Assisting the IRS from *outside* the organization are the Safe Workplace Associations (e.g. MASHA), the Ministry of Labour (MOL), Unions[15] and others. The MOL may exercise direct authority to resolve health and safety problems in the workplace, principally through its inspectors issuing orders. Listed in Table 2-1 are the direct and contributive components.

---

14 These include the Health and Safety Coordinator; Hygienist; and Nurse, etc.

15 The members of the Union, and their representatives who are employees of the employer are "internal" to the employer's organization. The Union will also have health and safety resources located "external" to the employer's organization.

While there is an IRS present in all workplaces, it can always be improved. The challenge is for everyone in the workplace to continually improve the way the IRS works.

TABLE 2-1: *Participants with Direct Responsibility in the IRS and Those with a Contributive Role*

PARTICIPANTS IN INTERNAL RESPONSIBILITY SYSTEM	
Direct Participants	**Contributive Participants**
Members of Board of Directors Executives Managers Supervisors Workers	INTERNAL Joint Health and Safety Committee Health and Safety Staff[16] Engineers[4] Other Staff[4] Union(s)[17] EXTERNAL Union(s)[5] Safe Workplace Association Workers' Centre Ministry of Labour WSIB Suppliers

2.2 KEYS TO A SUCCESSFUL IRS

1. Everyone must have a sincere wish to prevent accidents and illnesses;
2. Everyone must accept that accidents and illnesses have causes that can be eliminated or greatly reduced;
3. Everyone must accept that risk can be continually reduced, so that the time between accidents and illnesses get longer and longer;
4. Everyone must accept that health and safety is an essential part of doing his or her work. (Health and safety is not an extra, it is part of doing the job);

---

16 Although these parties are *contributive* to the IRS in the workplace in general, they are also *direct* parties to the IRS in their own workplaces.

17 See Footnote 3

5. Every person must have a clear understanding of what he/she is responsible for; what he/she can do to change matters; and when things must be done;

6. Every person must be regularly asked to explain what they have done to ensure health and safety on the job and in the workplace;

7. Everyone must have a clear understanding of their own skill, ability and limitations, and should have the capacity to carry out their responsibilities;

8. Everyone must attempt to avoid conflict when trying to reduce risk;

9. As an individual, each person must go beyond just complying with health and safety rules and standards, and strive to improve work processes to reduce risk;

10. When an individual cannot reduce risk by him/herself, then they must cooperate with others to go beyond just complying with health and safety rules and standards, and strive to improve work processes to reduce risk;

11. Everyone must understand the IRS process, believe in it, and take steps to make it effective at all levels in the organization; and

12. No one should be fearful of reprisals when using IRS processes.

2.3 PROCESSES FOR A SUCCESSFUL INTERNAL RESPONSIBILITY SYSTEM

2.3.1 The Main Processes

- Leadership at upper management levels—to inspire and motivate others to fully take part in IRS;
- Leadership at all levels—by continually trying to improve the work processes to reduce risk;
- Appropriate and clear delegation of responsibility and authority for all health and safety matters;[18]
- Clear accountability for all delegated responsibility and authority regarding health and safety matters;[19]
- Open and honest communication between and at all levels in the organization;

---

18 In this context: "delegation" means the entrusting of authority to a lower level in an organization; "responsibility" means an obligation to do, or not do, something; and "authority" means the power to take action, or make decisions.

19 In this context, "accountability" means the requirement to explain one's actions or decisions.

- A free flow of relevant and factual health and safety information to all levels in the organization;
- Take reasonable care by considering the effects of what is being done, and working to improve processes;
- Recognition that the IRS is a *dynamic* system that helps the workplace parties to recognize and solve problems, and reduce risk;
- Recognition that the IRS is a "system", and that its many parts must work together to be successful. (Like a mechanical system, a broken "part", or a "part" that does not fit or work correctly, can cripple the IRS.);
- Problem solving by individuals—identification and resolution of defects, anomalies, contraventions, hazards and risks;
- Creative and continual improvement of work processes by individuals. (This means that individuals do not simply follow the rules, but add value to the workplace by finding safer and healthier ways of doing the work, and spreading the word);
- Reporting to the next level of supervision when the individual cannot resolve the issue in a satisfactory way. When necessary, this should go all the way up to local or executive management; and
- Co-operative problem solving between the individual and the supervisor or manager. This can also include the co-operation of the contributive groups, such as the JHSC, or the health and safety staff.

2.3.2 The "Back-up" Processes

- The ability for the individual worker to take a problem to a worker representative[20] or the committee, if the IRS process is failing;
- The right of the individual worker to refuse unsafe work. This might be due to a problem the worker cannot correct, or when the IRS process is failing;
- Active examination of the IRS in action by the JHSC and others, to detect any failures in the IRS, and make recommendations for correction; and
- In general, concerns should be dealt with first by the people with *direct* responsibility, (that is: worker, supervisor, manager, and so on). Where a concern is not an immediate danger, the worker may need to allow time for supervision to resolve the issue. Where the "direct" responsibility processes stall or fail, then the internal "back-up" processes should be applied.

---

20 This could be a Health & Safety Representative (as defined under s. 8 of the OHSA), a certified member or other member of the committee, or a safety representative selected by some other process.

Taking an issue to the MOL should normally occur after the parties internal to the workplace try to resolve the concern.

2.4 *DIRECT* RESPONSIBILITY

2.4.1 Members of the Board of Directors

HEALTH AND SAFETY MISSION

- To provide organizational direction that will ensure that safe and healthy work is carried out.

ROLES AND RESPONSIBILITIES

- Set the broad vision for health and safety performance;
- Ensure that the executives are capable of establishing and maintaining the IRS and the health and safety management system, and are motivated to do so;
- Require evidence from the executives that the IRS and health and safety systems are functioning well;
- Respond promptly and appropriately to reports from the executives, and others, about the IRS and health and safety systems; and
- Hold the executives accountable for their health and safety performance.

2.4.2 Executives[21] (particularly the President or Senior Operating Officer)

HEALTH AND SAFETY MISSION

- To provide the leadership, resources and environment that will ensure that everyone can do safe and healthy work.

ROLES AND RESPONSIBILITIES

- Be visibly committed to making the IRS work, and inspiring others to make it work;
- Establish that the IRS is working by ensuring regular audits, and receiving and acting on reports;
- Be the role model, and set the tone for everyone else in the organization;

---

21 This includes Vice-Presidents and others in the Executive Management who have direct responsibility for actions in the workplaces of the organization.

- Be knowledgeable about the health and safety performance of, and events in, the organization;
- Determine the policy for safe and healthy work, and ensure that it is known throughout the organization;
- Ensure that programs and training are in place to make the policy work;
- Delegate authority and responsibility appropriately, particularly with regard to health and safety matters;
- Hold people accountable for the authority and responsibility delegated to them;
- Ensure that suitable management structures are in place;
- Ensure that the workplaces are suitably staffed, at all levels, to meet the health and safety objectives;
- Provide resources so that supervision and workers can carry out safe and healthy work;
- Ensure that adequate and suitable planning and engineering is done to provide safe and healthy workplaces;
- Ensure that adequate and suitable planning and engineering is done to provide the safe use of the resources;
- Provide for flexibility in the organization, so that it can change as required by the situation;
- Consider problems that affect the whole organization;
- Respond appropriately to health and safety reports from managers and others (particularly the JHSC)
- Take appropriate problems to the Directors; and
- Ensure there is a non-threatening environment when exercising rights pursuant to the IRS.

2.4.3 Managers[22]

HEALTH AND SAFETY MISSION

---

22 This includes all "management positions" at the mine site above the level of the front-line supervisor. Thus, for example, it includes Captains, Superintendents, and the Mine Manager.

- To know and understand the health and safety mission statement of the President, and to implement it;
- To find ways of improving health and safety in all areas under his/her jurisdiction.

ROLES AND RESPONSIBILITIES

- Be visibly committed to making the IRS work, and inspiring others to make it work to ensure that safe and healthy work can be successfully carried out;
- Determine the resources necessary to achieve the health and safety mission statement, and to communicate the requirements to the President;
- In consultion with the JHSC identify priorities and resources required for health and safety improvements;
- Providce, use and manage the given resources to ensure a safe and healthy workplace;
- Be knowledgeable about the health and safety performance of, and events in, the organization;
- Be aware of how this performance compares with that of similar organizations;
- Ensure the workforce (workers and supervisors) is trained to safely complete the work;
- Ensure the workforce (workers and supervisors) is informed about, and trained to deal with hazards in the workplace;
- Ensure that the training is current, and that it is regularly reviewed and refreshed;
- Ensure that the members of the workforce (both direct and contributive) understand their duties and responsibilities in making the IRS work properly;
- Be aware of, follow and demand compliance with all applicable legislation;
- Ensure that there is an effective mechanism for co-operative problem solving amongst workers and supervisors;
- Show commitment to the co-operative problem-solving and decision-making process;
- Use initiative in the improvement of all workplace processes, in order to reduce or eliminate risk;
- Encourage supervisors and workers to report unresolved health and safety problems;
- Respond appropriately to reports of health and safety problems, and to JHSC recommendations;

- Ensure that an effective mechanism is developed and implemented for auditing the operation of the IRS in the workplace (such as the JHSC), and act on the advice that comes forward from the audit;
- Be a role model by being concerned for the health and safety of the workers in all circumstances;
- Ensure that there is an effective mechanism for monitoring and modifying work practices and workplace conditions;
- Set standards for the performance of safe and healthy work;
- Set up job procedures to ensure that workers can carry out safe and healthy work;
- Ensure that periodic audits of job procedures are made, to make sure they are up-to-date and being used;
- Delegate authority and responsibility appropriately, particularly with regard to health and safety matters;
- Hold people accountable for the authority and responsibility delegated to them;
- Assign duties that match the authority, responsibility and accountability of the worker and supervisor;
- Keep abreast of industry 'best practices' and apply them where appropriate;
- Analyze and take action regarding serious incidents[23] and other problems that affect the whole operation
- Take unresolved health and safety problems to executive management; and
- Ensure there is a non-threatening environment when exercising rights pursuant to the IRS.

2.4.4 Supervisors[24]

HEALTH AND SAFETY MISSION

- To manage the adequate resources, so that the workers can perform their duties in an efficient and safe manner; and
- To find ways of improving health and safety in all areas under his/her jurisdiction.

---

23 "Serious Incident" means an incident that causes, or has the potential to cause, fatalities or debilitating injuries for life.

24 This is intended to cover primarily the "front-line supervisor", although some of the roles and responsibilities might apply to the second-line supervisors who have been included under the heading of "Managers".

ROLES AND RESPONSIBILITIES

- Plan work assignments to enable workers to produce safely;
- Ensure that workers understand the authorities, duties and responsibilities of all parties in making the IRS work properly and achieving safe and healthy work;
- Ensure that workers receive appropriate training and direction to understand their direct authorities, duties and responsibilities in making the IRS work properly and achieving safe and healthy work;
- Ensure that the workers understand the scope of their authority for health and safety, and for taking initiatives to reduce risk in the workplace;
- Ensure that the workers have received the appropriate training to carry out safe and healthy work, and that the training has been 'refreshed' as appropriate;
- Act as a facilitator for the workers;
- Encourage workers to report health and safety problems;
- Respond quickly and appropriately to worker concerns, and cooperate in their correction, or if beyond the authority or ability of the supervisor, take the matter to a higher level;
- Use initiative in the improvement of all workplace processes, in order to reduce or eliminate risk;
- Be aware of the applicable legislation and company procedures;
- Ensure that the workers are able to work according to the established work procedures and legislation, and hold them accountable for their actions and decisions;
- Set an example by being consistently safety conscious, and insisting on the safe performance of work;
- Supervise, advise and coach the workers as required;
- Use appropriate methods to convey safety and health information, and the "safe work" message (safety talks, tailgate conferences, safety demonstrations etc.);
- Observe the actual work in progress and provide positive input to the workers;
- Ensure that the workers are aware of potential hazards, and have dealt with, or a dealing with the actual hazards in the workplace;
- Manage the adequate resources;
- Involve workers in work planning, decision making and problem solving;
- Advise other workers of known unsafe conditions or work practices;

- If hazards cannot be dealt with due to lack of authority or resources, then protect the area and ask senior supervision for advice or additional resources
- Follow-up on unresolved issues referred to senior supervision; and
- Ensure there is a non-threatening environment when exercising rights pursuant to the IRS.

2.4.5 Workers

HEALTH AND SAFETY MISSION

- To perform assigned duties safely, according to established procedures and applicable legislation;
- To advise other workers and supervisor of hazards in the workplace; and
- To find ways of improving health and safety in the workplace.

ROLES AND RESPONSIBILITIES

- Perform assigned duties;
- Use safety equipment and devices as required;
- Correct or report unsafe conditions, serious incidents and other events;
- Participate in joint decision-making and problem solving;
- Work in a way that will not endanger him/herself, or others;
- Advise other workers of known unsafe conditions or work practices;
- Be aware of and follow all applicable legislation and safe work procedures; and
- Use initiative in the improvement of all workplace processes, in order to reduce or eliminate risk.

In general, concerns should be dealt with first by the people with *direct* responsibility, (that is: worker, supervisor, manager, and so on). Where a concern is not an immediate danger, the worker may need to allow time for supervision to resolve the issue. Where the "direct" responsibility processes stall or fail, then the internal "back-up" processes should be applied.

Taking an issue to the MOL should normally occur after the parties internal to the workplace try to resolve the concern.

2.5 *CONTRIBUTIVE* RESPONSIBILITY

2.5.1 Joint Health & Safety Committee, or Health & Safety Representative[25]

HEALTH AND SAFETY MISSION

- To take a joint approach to the improvement of the IRS in the workplaces, and to the reduction of health and safety risks to the workers; and
- To act as a resource to workers, supervisors and management.

[This is addition to carrying out the committee's or representative's mandate under the Occupational Health and Safety Act.]

ROLES AND RESPONSIBILITIES

- Be an advocate for the IRS and its continual improvement;
- Monitor the functioning of the IRS and make recommendations for its improvement;
- Inspect the workplace for the purpose of ensuring that workers and supervisors are reducing risks on a continuous basis;
- Investigate serious incidents and other events with a view to identifying and recommending elimination of fundamental causes of losses;
- Intercede to resolve a worker's concern where the IRS fails;
- Assist in the development of safe and healthy working procedures;
- Monitor the elements of the health and safety system (policies and programs) and to suggest ways of improving them;
- Contribute to the health and safety assessment of new facilities, equipment, material and processes;
- Determine what failures in the IRS caused work refusals to occur;
- Facilitate discussion among all members of the organization, particularly with respect to system-wide problems and opportunities;
- Provide a means by which insights and concerns of workers can be communicated to senior management;

---

25 This means the Health and Safety Representative under Section 8 of the Occupational Health and Safety Act.

- Act as another channel of communication between workplace parties;
- Act as a liaison for the MOL so that weaknesses in the IRS, and continuing health and safety concerns, can be brought to the attention of the inspector;
- Check that mechanisms are in place to monitor the performance of work; and
- Check that, when recommendations are made to change work procedures, the changes are made and maintained.

In general, concerns should be dealt with first by the people with *direct* responsibility, (that is: worker, supervisor, manager, and so on). Where a concern is not an immediate danger, the worker may need to allow time for supervision to resolve the issue. Where the "direct" responsibility processes stall or fail, then the internal "back-up" processes should be applied.

Taking an issue to the MOL should normally occur after the parties internal to the workplace try to resolve the concern.

2.5.2 Health and Safety Staff

HEALTH AND SAFETY MISSION

- To be a resource for all of the workplace parties with direct and indirect responsibility; and
- To be advocates for a well functioning IRS.

ROLES AND RESPONSIBILITIES

- Monitor the functioning of the IRS and make recommendations for its improvement;
- Educate all levels of the organization about IRS, and to actively promote it;
- Audit, or arrange for the audit of, the elements of the health and safety system, and to suggest ways of improving them;
- Regularly audit and inspect the operation for compliance with the Act, regulations and company procedures;
- Audit the management functions from a health and safety standpoint, and report their findings to senior management;
- Report to management on the safety and health status of the operation;
- Advise workers, supervisors and managers on technical safety and health matters;

- Advise the JHSC on technical safety and health matters;
- Advise trainers on the safety and health content of training courses; and
- Liaise with other operations, MASHA and similar resources to obtain up-to-date information on safety and health issues for the operation and the JHSC.

2.5.3 Unions

HEALTH AND SAFETY MISSION

- To ensure that the workers' health and safety interests are served.

ROLES AND RESPONSIBILITIES

- Appoint appropriate worker representatives, such as worker members to the JHSC;
- Monitor the activities of the JHSC, and to see that it is serving the health and safety interests of the workers;
- Promote change in the operation of the JHSC when the best health and safety interests of the workers are not addressed;
- Be an advocate to management, government and others for a strong and flourishing IRS;
- Judge whether the IRS is strong and flourishing, and if not take steps to promote change;
- Influence the workers to fully play their direct role in the IRS; and
- Consider the health and safety aspects of reports and notifications given to the Union, and where appropriate to take up the matter with the owner or Employer.

In general, concerns should be dealt with first by the people with *direct* responsibility, (that is: worker, supervisor, manager, and so on). Where a concern is not an immediate danger, the worker may need to allow time for supervision to resolve the issue. Where the "direct" responsibility processes stall or fail, then the internal "back-up" processes should be applied.

Taking an issue to the MOL should normally occur after the parties internal to the workplace try to resolve the concern.

2.5.4 Mines and Aggregates Safety and Health Association

HEALTH AND SAFETY MISSION

- To provide advice, information and audit services to individual mines, and to the mining industry.

ROLES AND RESPONSIBILITIES

- Promote the IRS in all of its prevention activities;
- Supply information to the industry and individual mines on their collective and individual health and safety performances;
- Provide or access training courses for workers, supervisors and managers;
- Provide health and safety audit services to Ontario mines;
- Access, collect, analyze and distribute mining health and safety information;
- Facilitate industry-wide collective action on health and safety issues; and
- Conduct or sponsor research on mining health and safety topics.

2.5.5 Ministry of Labour Mining Program

HEALTH AND SAFETY MISSION

- To advance safe ... workplace practices that are essential to the ... well-being of the people of Ontario.[26]

ROLES AND RESPONSIBILITIES RE IRS

- Focus on setting, communicating and enforcing legal standards;
- Promote the IRS;
- Promote workplace self-reliance;
- Review the functioning of the IRS in general, and give feedback to the workplace parties;

---

26 Extracted from the Ministry of Labour's Mission Statement [*Policy and Procedures Reference Manual.* Toronto, Ont.: Operations Division, Ministry of Labour (15 January 1997)].

- Monitor the effectiveness of the IRS during:

  Inspections;
  Investigations; and
  Dispute resolution;

  and give feedback to the workplace parties;

- When the IRS is judged to be failing, recommend to the workplace parties that they seek help from such sources as the SWAs, (MASHA), Workers' Centre, etc.;

- Detect industry-wide and sector issues and trends, and communicate them to the employers and JHSCs;

- Administer and enforce the legislation [issuing compliance orders is a *direct* action rather than a contributive action]; and

- Train the inspectors in their role in the IRS.

2.5.6 Workplace Safety And Insurance Board

HEALTH AND SAFETY MISSION

- To create safe and healthy workplaces, and provide a comprehensive and viable support and insurance system for injured workers and employers.

ROLES AND RESPONSIBILITIES RE IRS

- Promote the IRS in all of its prevention activities

- Motivate and support workplaces in becoming self-reliant in health and safety, in order to support the prevention of accidents and illnesses;

- Identify and communicate 'best practices' in injury and illness prevention;

- Advise workers and employers in accident prevention;

- Support research that will increase practical problem solving and informed decision-making in prevention of injury and illness;

- Operate incentive and penalty programs to encourage employers to achieve good performance regarding injury and illness;

- Gather and communicate data regarding the prevalence of accidents and illnesses; and

- Develop and communicate prevention programs; and

- Encourage the promotion of the IRS by the SWAs, Clinics and Workers' Centres under its jurisdiction.

2.6 QUESTIONNAIRES AND AUDIT APPROACH

Given the model of the IRS described in the sections above and building on experience gained during the pilot audit, we modified the questionnaires administered during that audit. We used the same number of different questionnaires as we had used in the pilot audit. There were 10 different questionnaires—for six levels of direct responsibility and for four levels of contributive responsibility:

Direct Responsibility	Contributive Responsibility
Company Directors	Co-chairs of the JHSC
Senior Executive Officers	Certified Members
Mine Managers	OHS Specialist
Senior Supervisors	Ministry Inspectors
Front-line Supervisors	
Workers	

The questionnaires used, together with the instructions for filling them in, are presented in Appendix 1.

We used the same approach to the trial audit as we had in the pilot audit—a full description, of which, is provided in Chapter 3 of *Interim Report #2.* Briefly, it was our aim to administer questionnaires to about 25 workers in each mine (the numbers varied between 14 and 27), five front-line supervisors (the numbers varied between 3 and 7), three middle managers (the numbers varied between 0 and 5), the mine manager, the two JHSC co-chairs and two certified members, and the health and safety co-ordinator. At each site, we conducted follow-up interviews with about one third of the workers and front-line supervisors, about half the middle managers and JHSC members, and the mine manager and the health and safety co-ordinator. We also informally interviewed workers as we took a tour of the underground mine. In addition, we asked each mine to provide us with documentary evidence that they felt would serve to illustrate functioning of the IRS at the site. Off site, we administered questionnaires to the MOL inspector(s) responsible for the mine, and attempted also to administer questionnaires to two senior executives and a company Director for each mine, and conducted follow-up interviews with all who answered the questionnaires.

3. AUDIT VALIDATION

In this Chapter we shall examine how responses to the questionnaires relate to the safety records of the mines visited. It is an exercise that is crucial to establishing the validity of the audit tool and, further, can provide insight on how the tool's questionnaires may be further modified to more accurately reflect the workings of the IRS.

3.1 OVERVIEW

Table 3-1 summarizes the extent of the data and information gathering. As may be seen, 267 questionnaires were administered which resulted in more than 9,000 individual questions being answered. (Aggregated data from the questionnaires are presented, on a question by question basis, for each mine and contractor firm in Appendix 2.) We conducted follow-up interviews with somewhat over half of the respondents. These interviews, together with the underground tours at each mine and the documentation each mine provided, gave us valuable insight (in a non-quantitative way) into how the IRS was operating at that location.

To help in the validation, we asked MASHA to provide the trial-audit mines' accident statistics for the period 1995 to the present; and this was done. The data MASHA provided were: total medical incident (TMI) frequency, lost time incident frequency (LTI), severity, and fatalities. We also received data on total hours worked and number of employees for each reporting period (annually, except for the year 2000). Because MASHA only had statistics for Inco's Ontario Division as a whole, we obtained the statistics specific to Creighton Mine from the Company itself.

A vast amount of data has been collected from the six mine visits and complete analysis will take many more months than the resources we have available for the project. Accordingly, we chose to concentrate on two facets of the data contained in the questionnaires. One involves a question that probes what respondents believe the IRS ***should be***, and the other looks at groups of questions that have a bearing on various aspects of actual IRS performance.

TABLE 3-1: *Tally of Questionnaires Answered and Follow-up Interviews Conducted During the Trial Audit*

	QUESTIONNAIRES ANSWERED	FOLLOW-UP INTERVIEWS
COMPANY DIRECTOR	4	4
SENIOR OFFICERS	10	9
MINE MANAGERS	8	8
MIDDLE MANAGERS	19	13
FRONT-LINE SUPERVISORS	34	18
WORKERS	151	56
CO-CHAIRS	11	8
CERTIFIED MEMBERS	15	13
H&S CO-ORDINATORS	7	7
INSPECTORS	8	8
TOTALS	**267**	**144**

3.2 THE QUESTION #1 DATA

The question that probed what respondents thought the IRS ought to consist, was probably the single most substantive change to the questionnaires that we had administered in the pilot phase of the project.[27] This question was based on the description of the IRS presented in Chapter 2. It took the form of a multiple-choice question,

1A. In the following list put a check mark against **every** statement that applies

"I believe that the Internal Responsibility System (IRS) **should be** where:

- **a** **everyone (from the rockface to the Boardroom) looks after health and safety as part of doing their job;**
- **b** **the workers are the only ones to look after their own and co-worker safety;**
- **c** **the supervisors and managers co-operate with the workers to head off and solve problems;**
- **d** **we all work together to make things better by reducing or eliminating the health and safety risks;**
- **e** **the Health and Safety Committee is directly responsible to make the workplace safe;**
- **f** **the Company President has some responsibility for the worker's health and safety;**
- **g** **the supervisor only makes sure the workers follow the rules and procedures;**
- **h** **if the worker cannot fix the problem, the supervisor will help find the answer;**
- **i** **if the worker cannot fix the problem, the only way out is to refuse to work;**
- **j** **the Health and Safety Coordinator finds the problems and tells the workers to fix them;**
- **k** **the Health and Safety Committee are resources;**
- **l** **the Health and Safety Committee help resolve issues when other ways fail;**
- **m** **we go beyond fixing problems and try to improve the health and safety in the work processes."**

and was the first question in ***every*** questionnaire—in other words, everyone in the chain of responsibility and in contributory roles answered the ***same*** question.[28]

Each individual's understanding of the IRS was scored by assigning 12.5% to each of **a**, **c**, **d**, **f**, **h**, **k**, **l**, and **m** and –20% to each of **b**, **e**, **g**, **i**, and **j**, and adding the result.

---

27 There were other changes, including both the removal and addition of some questions. We also changed the way we referred to the IRS in the body of the questionnaires; a change we made because of encountering a number of respondents in the pilot phase of the project who were not familiar with the terms "Internal Responsibility System" or "IRS".

28 There were some very minor variations to make the statements appropriate to the IRS level to which the particular questionnaire was aimed, but the sense and intent of the statements were preserved.

Thus respondents would score 100% if they ticked **a**, **c**, **d**, **f**, **h**, **k**, **l**, and **m**, but no others, and 0% if they ticked all 13 alternatives or if they ticked none at all (–100% would be achieved if **b**, **e**, **g**, **i**, and **j**, but no others were ticked). In cases where there were negative scores (and there were a few), we assigned 0%. The aggregated results from all respondents are presented in Table 3-2 (and the aggregated results for each mine can be found in Appendix 2).

The results from this question give very good overview of the current understanding of the IRS. Using the scoring scheme described in the paragraph above, the overall understanding of the IRS stood at 70 percent. In general, understanding improves as one moves up the line of direct responsibility within the mine site. Mine workers, as a group, show the lowest level of understanding and mine managers show the highest; understanding decreased somewhat at the corporate level. The health and safety component (JHSC members and health and safety co-ordinators) also showed high levels of understanding. Similar distributions in understanding can also be seen when the mines are looked at on an individual basis.

These observations show that there is room for improvement—in other words, the IRS message still has to get "down the line".[29] It is also noteworthy that everyone at the corporate level believed that "the Company President has some responsibility for workers' health and safety", but only two thirds of workers believed that this was so. Again, this indicates a need to get the IRS message "down the line".

The success of this multiple-choice question in giving a "snapshot" of the level of understanding of the IRS at a mine site became apparent to us early in the trial audit visits. And, because of this, we took the opportunity to combine the multiple-choice question with a supplementary question asking the respondents for an assessment of how the IRS was actually working at their workplace:

1B. Given my answer to the question 1A, I believe the IRS is working effectively in my workplace [CIRCLE ONE]:

Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree	Not Applicable	Don't Know

29 This was also commented upon by a worker health and safety representative during a debriefing at the end of one of our mine visits at which we presented the breakdown of responses to Question 1A for that mine.

TABLE 3-2: *Summary of Answers to Question 1A as Percentages*

"I believe that the Internal Responsibility System (IRS) **should be** where:	Wkr n= 151	FLS n= 34	MM n= 19	Mgr n= 8	Exec n= 10	Dir n= 4	JHSC n= 26	HS C n= 7	Insp n= 8	Avg. n= 267
everyone (from the rockface to the Boardroom) looks after health and safety as part of doing their job;	88	91	100	100	100	100	100	100	100	**92**
the workers are the only ones to look after their own and co-worker safety;	11	6	0	0	0	0	0	0	13	**7**
the supervisors and managers co-operate with the workers to head off and solve problems;	71	94	95	100	80	100	96	100	100	**81**
we all work together to make things better by reducing or eliminating the health and safety risks;	81	97	95	100	100	100	96	100	88	**88**
the Health and Safety Committee is directly responsible to make the workplace safe;	24	15	11	13	20	50	19	0	25	**21**
the Company President has some responsibility for the worker's health and safety;	67	79	79	100	100	100	81	86	78	**75**
the supervisor only makes sure the workers follow the rules and procedures;	9	3	0	0	0	0	4	0	0	**6**
if the worker cannot fix the problem, the supervisor will help find the answer;	77	91	79	100	80	100	88	86	75	**82**
if the worker cannot fix the problem, the only way out is to refuse to work;	11	3	0	0	0	0	0	0	0	**7**
the Health and Safety Coordinator finds the problems and tells the workers to fix them;	11	6	0	0	0	0	4	0	0	**7**
the Health and Safety Committee are resources;	66	79	79	100	100	100	92	100	88	**75**
the Health and Safety Committee help resolve issues when other ways fail;	68	76	89	50	40	25	77	57	88	**70**
we go beyond fixing problems and try to improve the health and safety in the work processes."	66	79	84	100	90	100	88	100	88	**75**

"SCORE"	60	80	85	91	82	81	85	91	82	70%

This supplementary question was used for four of the six mines in the trial audit. It was not, however, asked in the questionnaires for inspectors, senior executives, and company Directors. In scoring this question we assigned 0% to "strongly disagree". 33% to "somewhat disagree", 67% to "somewhat agree", and 100% to "strongly agree".

Combining answers to Questions 1A and 1B provides us with a means to judge the state of the IRS at the mine site. Working on the assumption that individual respondents' assessments of the IRS in their workplaces (i.e., Question 1B) are of greater validity the higher they scored on the understanding part of the question (i.e., Question 1A), we multiplied each individual's score for 1B by their score for 1A. The resulting product is a measure of the effectiveness of the mine's IRS according to that individual.

We then looked at the effectiveness of the mine's IRS, as judged by mine-workers' responses to Questions 1A and 1B (mine workers were the only group that really contained enough responses to make a comparison valid), and compared them with that mine's safety record. The statistics we chose for this comparison were TMI and LTI frequencies. In order to make the comparison meaningful, we needed to calculate the frequencies over a reasonably long period. Because the safety statistics for one of the four mines only started in 1997, we used the period of 1997 to April 2000 to make the comparisons.

In Figure 3-1, we plot the TMI and LTI frequencies against the effectiveness of the mine's IRS and, as may be seen, the correlation is remarkably good. The correlation coefficients (r) of 0.99 and 0.94 for TMI and LTI mean that the regression lines are significant at the 1% level and 5% level, respectively.[30] This is strong evidence that answers to the combination question, at least those given by workers, can be a good indicator of the safety performance of the mine.[31]

---

30 Significance at the 1% level, means that such a regression line would be likely to occur by chance ***only*** one time out of a hundred and, at the 5% level, the likelihood would be one time out of twenty.

31 We should note, at this point, that assessments of IRS effectiveness as judged by answers from the other groups in the IRS were ***not*** significantly correlated with the safety statistics.

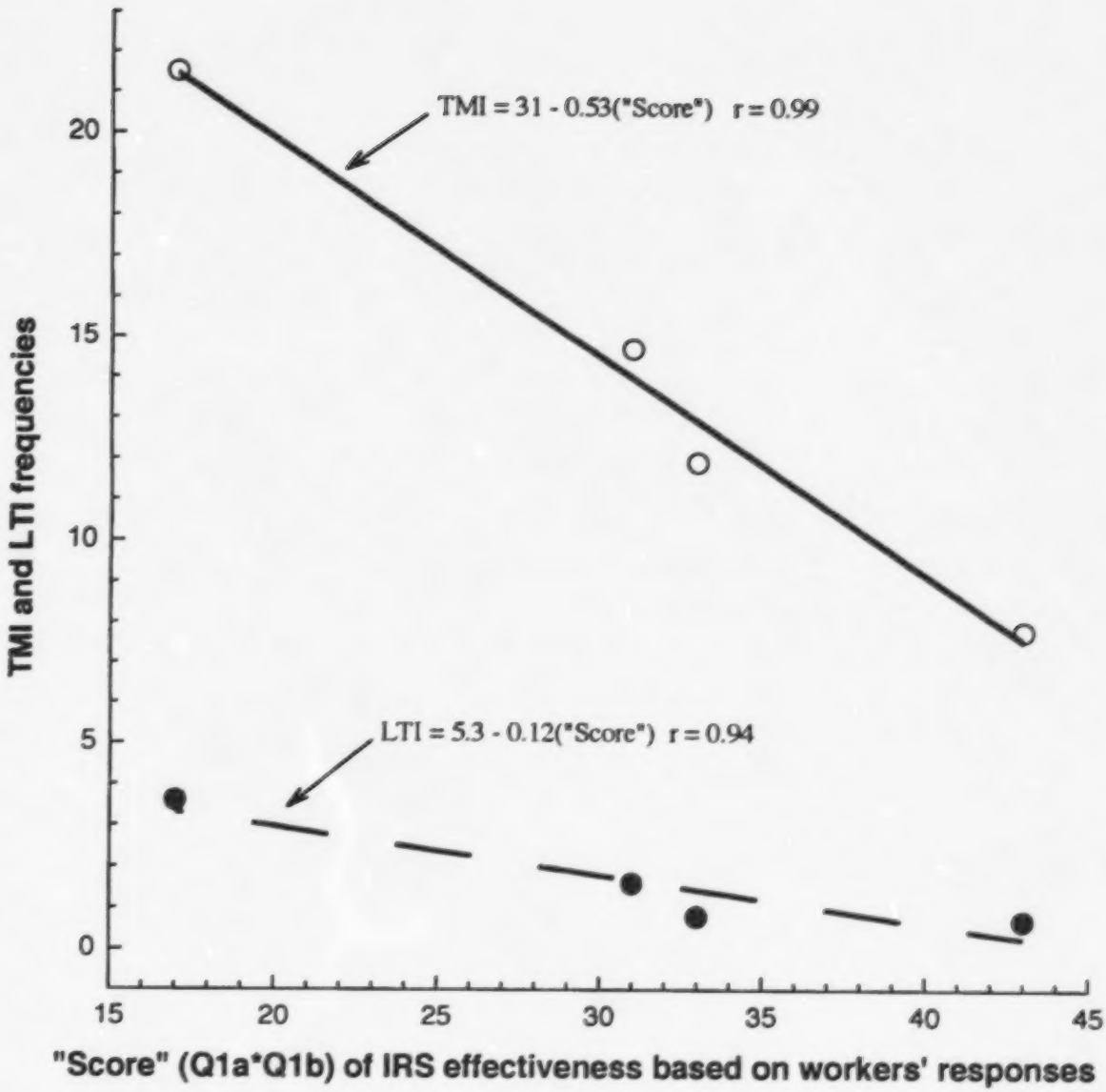


FIGURE 3-1: *A Mine's Safety Performance vs. the Effectiveness of Its IRS (as measured by workers' responses to Questions 1A and 1B)*

3.3 IRS PERFORMANCE INDICATORS

Although the Question 1 combination appears to give a reasonable view of a mine's IRS, it is rather one dimensional. The questionnaires contain considerable information from the answers to the 30 to 40 questions that each contain. Many of the questions were designed to probe the flow of information and responsibility up and down, and within, the responsibility chain. Accordingly, we looked at a variety of ways to combine groups of questions dealing with similar topics. The approach we used was based on, and expanded from, the one we adopted to obtain overall performance scores from the pilot audit (a general description of that process can be found in Section 4.2 of *Interim Report #2*). As we did for the pilot audit, we looked at the questions from three different standpoints—Understanding of the IRS, Leadership in the IRS, and Indicators of how the IRS is performing. Within these three main groupings, we had a number of question clusters that dealt with different aspects of the main group—the questions that comprised the main groups and the individual clusters, are presented in Appendix 3 and a description of the spreadsheet method we used to analyze the responses from the trial audit is presented in Appendix 4.

To investigate relationships with safety statistics, we chose the clusters of questions dealing with indicators of IRS performance. These clusters dealt with the nine indicators of IRS performance shown below and involved all levels of the responsibility system.[32]

Beliefs [34][33]	Responsibility [4]	Accountability [8]
H&S concerns & responses [16]	Initiatives & responses [26]	IRS issues & responses [45]
Demonstrating leadership [39]	Work planning [8]	Information flow [6]

Because these questions were asked at all the mines in the trial audit, we can compare the IRS performance with the safety records for all six. To make this comparison, we arbitrarily took the average of the scores of all nine indicators and plotted

---

32 The actual questions that make up these clusters are presented in Appendix 3.

33 The figures in brackets indicate the number of questions in each suite.

TMI and LTI frequencies (again for calculated for the period 1997 to April 2000) against this average. The result is shown in the graphs presented in Figure 3-2.

Considering the assumptions made in selecting the questions for the individual indicators and the arbitrariness of merely averaging the indicator scores, the correlation of overall performance indicator with the safety statistics is very good. The correlation coefficients (r) of 0.86 and 0.72 for TMI and LTI mean that the regression lines are significant at the 5% and 10% levels, respectively. However, when we look at the correlation's of the individual indicators the situation is less clear:

INDICATOR	TMI	LTI	INDICATOR	TMI	LTI	INDICATOR	TMI	LTI
Beliefs	*	n/s	Responsibility	n/s	n/s	Accountability	n/s	n/s
H&S concerns & responses	*	*	Initiatives & responses	*	n/s	IRS issues & responses	n/s	n/s
Demonstrating leadership	n/s	n/s	Work planning	**	n/s	Information flow	*	*

** = significant at the 1% level; * = significant at the 5% level; n/s = not significant at the 5% level;

We have no ready explanation for why some indicators correlate significantly with safety statistics while others do not. The variation may have to do with the questions chosen to represent the particular performance indicator, or it may have to do with the manner in which various levels in the responsibility chain choose to interpret and answer the questions. It does appear, for example, that indicators with a higher proportion of responses from the worker questionnaire are more likely to show significant correlation with safety performance. We shall investigate these matters further in the next two Chapters when we explore how the trial audit questionnaires can, in light of the demonstrated relationships with safety performance, be "fine tuned" to produce the final questionnaires.

3.4 CONCLUSIONS

The data presented in this Chapter clearly demonstrate that answers to the questionnaires can be related to a mine's safety performance. The Question 1A and 1B combination, particularly as answered by mine workers, shows promise as an easily administered and interpreted tool that can give a quick assessment of the IRS at a particular mine.

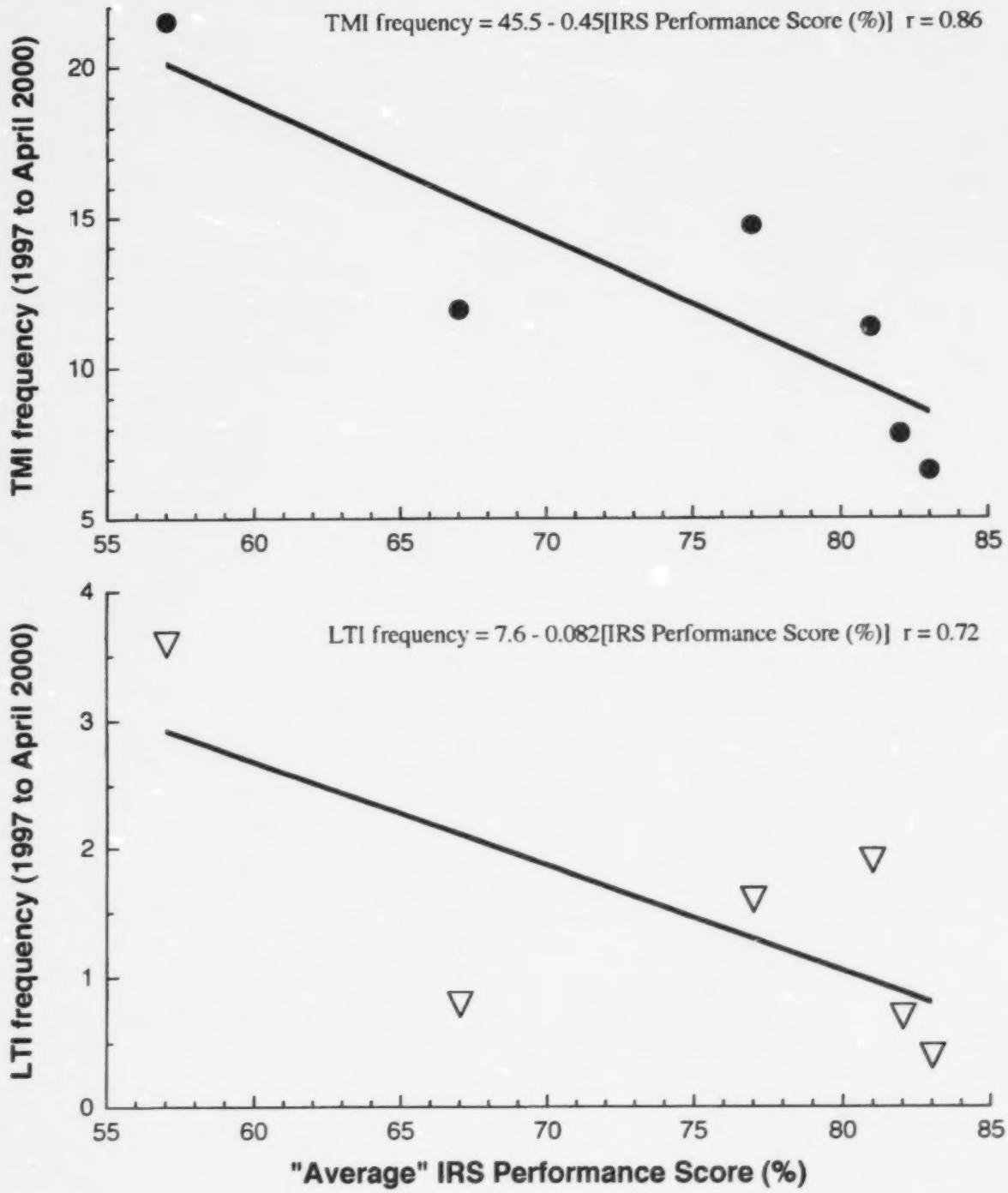


FIGURE 3-2: *A Mine's Safety Performance vs. the Combined Performance Indicator of Its IRS*

In addition, if it is accepted that the questionnaires do provide a measure of how the IRS functions in the mine (and we have no reason to suspect that they do not), then one can conclude from the correlations that better performance in the IRS will lead to a better safety record.

6. CONCLUSIONS AND RECOMMENDATIONS

In this Chapter we summarize our overall conclusions, make recommendations as to how the audit tool might be modified, and offer suggestions as to how the interested parties might use the results of this study.

6.1 CONCLUSIONS

With the assistance of the IRS Steering Committee we produced a description of the Internal Responsibility System. We set out the roles and responsibilities of the contributors to the IRS, as well as a number of processes important for a successful IRS. The model of the IRS we developed is consistent with previous descriptions in the Ham and Burkett Reports. In Chapter 2 we clarified concepts and processes associated with a well functioning IRS.

The model was used to generate questions for the IRS audit tool. The structural aspects of the IRS led us to pose questions to people at all levels in the organization as well as to the Joint Health and Safety Committee and the OHS professional. We frequently asked questions in couplets—asking people at two different levels of the organization complementary questions to corroborate certain activities. This tends to overcome a natural human tendency to exaggerate one's own positive actions. The functional aspects of the IRS model pointed to necessary questions about certain key behaviours. And, on the basis that understanding leads to action, we also asked questions about beliefs and principles.

The audit tool, and hence the model, was tested against reality. Two mines were visited in an initial phase to work out the main "bugs" in the survey tool. Very importantly, at the end of this initial phase, we devised a 13 part multiple choice question that allowed a "snap shot" assessment of whether a respondent had a good understanding

of the IRS. Following adjustments in the questions, a further six mines were audited. The purpose was to validate the audit tool.

A critical test for an IRS audit tool is the correlation between a high score on the audit and a high "score" in OHS performance, namely a low level of occupational injury. Conversely, a company with a poor score on the IRS audit should have a poor accident record. This is the primary method of "validation" of the audit tool. As described in Chapter 3, the audit tool was an excellent predictor of OHS performance. The audit tool was validated. If the IRS is working well, the organization has fewer accidents, as measured by medical aids (and to a lesser degree, as measured by lost time).

In the process of analyzing the data, we had further insights as to how the audit tool could be improved, and these will be the basis for some of our recommendations below. We also have some suggestions regarding the administration of the audit tool; some of these suggestions are based on the advice of the Steering Committee.

The Steering Committee consists of representatives of many of the parties contributing to the IRS. While it is not our mandate to make recommendations to each of the parties, we thought it helpful to at least make some suggestions as to how the description of the IRS and the audit tool might be used.

6.2 FURTHER MODIFICATIONS OF THE AUDIT TOOL

The time constraints for this project do not allow us the opportunity for another iteration of testing the audit tool. We do, however, suggest that this be done. There are many comments in Chapter 4 during our analysis of the IRS performance clusters about weak questions and suggested re-groupings. In both Chapters 4 and 5 we made some suggestions as to possible replacement questions. An important observation coming from both chapters 4 and 5 is that while there may be an educative purpose in asking IRS questions of certain people in the IRS, the weakness of self-assessment questions becomes obvious. Many of our suggestions have to do with removing questions where everyone was in strong (usually positive) agreement with a statement, regardless of the OHS performance of the mine the people were associated with. Instead, other people in the organization should be giving their assessment of the people's beliefs and actions that we are interested in. We believe that the following types of modifications would give a better overall correlation with OHS performance, as well as improve the correlation of sub-groups and even individual questions.

- Elimination of questions that tended to cause confusion
- Decrease in the number of questions directed to senior management
- Increase in questions to non-senior management about the beliefs and actions of senior management
- Elimination of questions that had little contribution to the correlation with OHS performance
- Change in wording of some questions so as to be more specific or more action oriented
- Re-classification of a small number of questions in the thematic clusters of questions used to focus in on the causes of IRS performance
- A change in the number and nature of the thematic clusters of questions

There is a temptation to drop a lot of the questions to the most senior people on the basis that they tended to answer positively regardless of their company's OHS performance. While some should be dropped, it would be a mistake to stop asking senior people questions. It is far better to ask corroborative questions of others in addition to questions directed to senior people. Dropping questions to senior people completely would tend to undermine the whole exercise in the minds of many participants. In our interviews, we got very positive responses from workers when we told them (in response to their questions) that, yes, managers and executives would be answering similar questions.

We have come full circle on the use of the phrase "Internal Responsibility System". We did use the phrase in the pilot audit of two mines. In the follow-up interviews during this phase, we found that many people were confused by the phrase. In the subsequent trial audit of six mines, we decided not to use the phrase in most of the audit questions, particularly in questions directed to the direct contributors (we would expect the OHS professionals, JHSC members and inspectors to be familiar with the phrase). Instead of "Internal Responsibility System", we used the phrase: "the Company-wide system of responsibility for individual and co-operative action to take care of health and safety issues". The latter phrase is very awkward, and is subject to its own misconceptions. We believe that over time the phrase "Internal Responsibility System" will become more familiar to people. What we suggest is the phrase be used in the questions, but that the following statement be placed at the front of the survey (and possibly as a footnote):

"When you see the words "Internal Responsibility System" (IRS) in a question, this means what you described in your answers to Question 1a."

This will simplify the wording of a lot of questions, and over time it will reduce misunderstanding. The use of the phrase itself has an educative value.

We also found that there was some confusion between the use of the term "IRS" and health and safety management systems in general. They are not the same. We were getting positive responses from some senior people about IRS questions when they meant OHS systems in general. Consideration should also be given to adding a text box on a covering page, or a footnote below the relevant questions stating, to the effect that: "Please answer on the basis that the IRS and OHS management systems are not the same thing".

More work needs to be done to better calibrate the IRS audit. Better calibration means, in part, that a greater range of OHS performers is surveyed. Testing the audit on a set of workplaces with a greater diversity of OHS performance will result in a greater range of OHS performance to correlate with IRS performance. Better calibration also means testing the tool against a larger number of workplaces. This calibration should be done with the suggested improvements in the number, nature and groupings of the audit questions, as discussed in Chapters 4 and 5.

6.3 THE IRS DESCRIPTION

The description of the IRS is useful in and of itself. A single, authoritative description will reduce misunderstandings about the IRS. Too often in the past one got the sense that people were discussing the IRS while assuming that there was a shared understanding. We are better able to strengthen the IRS when there is a consistency of understanding.

A clear description of the IRS can be incorporated into policy statements, organizational OHS manuals, training materials, and so on. This is the case not only for employers, but also for government and Safe Workplace Association publications.

Certainly more work can be done by the MOL, MASHA and others to find ways of bringing the IRS model to life—for example, providing visual representations, videos, websites, creating refreshed textual messages about the IRS in publications, and so on.

To be a little more forceful about it, the description of the IRS is perhaps the most important outcome of this project. The IRS model is what we will always return to when learning how to engage in "IRS analysis" and when we need to re- write or re-fresh the questions in the IRS audit tool.

6.4 THE IRS ANALYSIS

There is an outcome of this project that is conceptually part way between the IRS description and the IRS audit tool. That is, the IRS model can be used to analyze OHS situations, problems and opportunities in new ways. Most health and safety problems can be analyzed in terms of the root problems with the "people factors" in the organization. We call this "IRS analysis".

Health and safety professionals are used to the notion that the best way to drive risk down is to go behind the obvious direct causes of accidents and find the root causes, or fundamental causes, of losses. In the past, this has typically meant failures in the management system. There are many varieties of OHS management systems, and of OHS system audits. Almost all model OHS systems have an element that involves "organizational arrangements"—i.e., who's responsible for what regarding OHS. However, this "people element" is not as well thought out as it should be. One gets the sense that the desire to avoid blaming people—which is an important notion in current OHS practice—leads to an avoidance of clarity about personal responsibility within the management system. IRS analysis is a method of analyzing part of the OHS system—the most important part—the beliefs, actions, communication, cooperation, and so on of all the people in the workplace.

In order to discover root problems, traditional system analysis would ask:

- is the appropriate program in existence to deal with the identified hazard in the workplace?
- are there measurable standards for that program?
- have these standards actually been met in the workplace?

If, for example, a WHMIS program is needed, one would identify the requirements of such a program and then check to see if those standards have been met. If an accident or close call occurs with hazardous materials, we would analyze the problem in terms of the

appropriateness of the program standards, the effectiveness of our measurements, the degree of deviation from the standards and the steps necessary to achieve conformance to the standards.

All of this system analysis might be done without much analysis of ***who*** was responsible for planning, leading, organizing, and controlling regarding the program, what their authority was, ***who*** was checking them, what the history of worker complaints and reports regarding the program were, the knowledge and initiative of supervisors regarding program weakness, and so on.

What IRS analysis does is put the people of the organization front and centre in the analysis. Whatever the initial problem, we go behind to ask what are the weaknesses of the IRS that allowed the problem to develop unchecked. We figure out how the IRS can be repaired or strengthened so that a similar problem does not emerge in the future. One still does the usual system analysis, but it is augmented with questions that flow from an understanding of the way the IRS is supposed to work.

Who should be doing IRS analysis? Well, everyone should be engaged in IRS analysis to some degree. Within the central core of the IRS, the chain of direct responsibility, the health of the IRS itself should be a major concern of mid to senior management. Instead of merely responding to the face value of an OHS issue, the senior manager should ask if this problem is the kind of problem that should have moved up the organizational structure, and if not, why wasn't the problem dealt with in a routine fashion by the worker and supervisor levels of the organization. The manager should be asking him or herself: "What authority or resources did they lack that they felt that they could not solve this problem?" and "If there was a lack of information, authority or resources, why was the problem not passed on up to a higher level of the organization?".

The OHS professional and the JHSC members would do a much better job of handling issues if they became accustomed to thinking in IRS terms. When a work refusal occurs, too often we deal with the superficial issue, without trying to figure out what the weaknesses in the IRS were that caused this worker to engage in a work refusal. Very few work refusals are about sudden, previously unknown issues. They are almost always about problems everyone knew about for a long time. IRS analysis would take us beyond the question "is this work safe?", to "why wasn't this hazard dealt with by the people responsible within the day to day routine?"

Similarly, while we made no direct observations, it follows that a MOL inspector has greater success in obtaining compliance if he or she goes beyond compliance into the IRS. IRS analysis assists when reviewing JHSC minutes, handling refusals, investigating accidents and so. Knowing that the inspectors go behind the obvious to determine failures of leadership, communication, cooperation, initiative, delegation, accountability and so on, would be a motivation for senior managers to stimulate and strengthen the IRS. It is not that people would be prosecuted or be given orders expressly for "failures within the IRS", but rather IRS analysis would locate individuals needing external stimulation or stimulation from the higher levels of the IRS.

Perhaps prosecutors who have a better understanding of the IRS would not engage in certain types of plea bargaining if they were analyzing the case from an IRS perspective. Withdrawing charges against individuals because a corporate entity agrees to plead guilty to a charge sends a message to the workplace which is the exact opposite of what is intended by the philosophy underlying the legislation. Some thought might be given to ways to focus the minds of members of the judiciary on the IRS when determining cases.

6.5 THE IRS AUDIT

We have shown very strong support for the principle that if the IRS is working well an organization will have fewer accidents. The IRS audit is a tool for measuring how well the IRS is working. But the IRS audit does more than that. It also enables the user to find out *why* the IRS is working the way it is, and thus provides some guidance as to what actions might be taken to improve the IRS.

6.5.1 A Tool for Measuring Overall IRS Performance

Use by Parties Internal to the Workplace: What use can the audit tool be put to by the people within the workplace? The organization can track itself over time if the audit tool is used consistently. This means that the effect of specific interventions can be measured. When an initial audit reveals certain weaknesses in the IRS, and steps are taken to eliminate those weaknesses, the organization can measure whether those steps had the desired effect.

It is also possible for a large, multi-location organization to use the audit tool to compare performance at the different locations. Further analysis as to why IRS performance varies between sites will provide insight leading to more precise interventions.

The ability of the organization to compare itself to others—"best performers" or the industry average—will depend almost entirely on an external entity safeguarding the consistent application of the audit across organizations.

One trap we would hope no one falls into is the belief that there is an acceptable level of IRS performance, which, once reached, signals that further OHS efforts are not required. The continuous improvement principle must be expressly adopted. There is no acceptable "end point"—we should be seeking to continually improve the IRS.

Use by Parties External to the Workplace: How can this tool be used by parties external to the workplace? Examples of such external parties would be the MOL, the WSIB, the Safe Workplace Associations such as MASHA, and the Workers Health and Safety Centre. These entities can use the tool as a means of identifying organizations in trouble. While all organizations need to keep improving—there is no "acceptable level of IRS performance"—the audit tool will identify those who need incentives, deterrence, education, advice and so on.

It should be noted that the predictive value of the audit tool works even if there is no actual use of the tool. All one needs to do is identify the organizations with poor medical aid and lost time statistics and you have identified the organizations with weak IRS performance. There is a temptation to say that this is merely stating the obvious, but it must be recalled that this study showed the relationship between the "end of stream" statistics and IRS performance. The statistics predict which organizations need the more intense analysis based on the full set of questions—the analysis focussing on why the IRS is performing poorly.

We tend to worry about identifying the poor performers, but we can also use the IRS audit and its correlation with medical aid to identify the excellent performers. We may want to reward such performers or in a world of scarce resources, we may want to ignore them from an enforcement point of view. Alternatively, we may want to analyze them further to find out why the IRS is working well, and what steps the organization took to get where it is. In which case a full audit and full analysis is in order.

From outside the workplace looking in, who can use the audit tool (or its predictive function)? Obviously the MOL can find organizations that need the encouragement that only inspectors can give. The Safe Workplace Associations such as MASHA, as well as the Worker Health and Safety Centre, can find the organizations that

need education, further analysis and advice as to how to make improvements. The WSIB might want to identify the organizations deserving of rebates or surcharges or suitable for a system audit such as the WSIB's "Workwell Audit". And, as mentioned, these organizations may also want to find the good performers.

6.5.2 A Tool for Finding Out Why the IRS is Performing as It is

It is vital that users of the audit tool do not rest with the final "scores", but use the tool to probe deep into the organization to see why the numbers turned out the way they did. This analysis is the most important use of the audit tool, particularly for the people within the workplace.

Whether or not an IRS audit was done to identify a problem performer, a full IRS audit would need to be done to so as to provide information about the sources of weakness or failure. We may also want to find the reasons why the best performers are the best. An overall "IRS score" doesn't tell you any more than overall frequency or severity statistics. What we want to know is, which groups of people are doing or not doing what types of key activities? With this knowledge we can then proceed in a very focussed way to make changes to improve the functioning of the IRS. The image is "scalpel" rather than "shotgun". For example:

- Why in our organization is there such a difference between worker responses and supervisor responses?
- If a particular group is showing very unfavourable responses, why is this so? What changes would have to be made to improve things?
- What can we learn from a group of people in the organization who had excellent responses?
- If, in our organization, we have uniform and positive understanding of certain key concepts, or the holding of key beliefs, on the part of the most senior people, yet responses are mixed lower down in the organization, is there a communications issue? What can we do about it?
- If a certain group of people do not believe they can bring problems or innovations to the attention of their supervisor, what is the history and cause of this pattern?
- Why are some workers going to the JHSC before trying to work with their supervisor?
- What does it mean if the mine manager or the CEO reveals that he or she does not believe a mine manager or a CEO can cause accidents?

- What advice can we give a senior executive if few people elsewhere in the organization can think of instances of health and safety leadership on the part of that executive?

- We have a job planning process and a program for pre-job briefings, but workers don't believe they are involved in planning the work. Are our programs just "paper programs"? What is getting in the way of bringing them to life?

- A large proportion of people are indicating they don't know who the OHS professional is, or they never get a chance to see a JHSC member, so what is going on?

- If people will report problems, but believe that taking initiative to creatively improve work processes is not worthwhile, why do they think this, and what can we do about it?

We could go on. The point is to find out why a score is high or low. The answers tell you where to look further to find the real problems in the organization—the people problems. Fixing these is not like fixing superficial problems. Fixing superficial problems means "picking dandelion flowers"—the roots will push up more. We will do a lot of busy work forever if we deal only with superficial problems. If we fix the underlying "people problems" in the organization through IRS analysis, then we end up fixing a lot of superficial problems indirectly. Fixing the IRS is like digging out the dandelion roots. It's not a permanent solution, but it is a long term solution. It is the only way to continually and substantially drive risk down.

6.5.3 Administration of the Audit Tool

Proper Modification of the Audit Tool: Many of the questions in the audit tool ask people about other people—not by name, but by role or function. If we ask people about the actions of the CEO or the OHS professional, it would be best if we are certain that the respondents actually know who the CEO and OHS professional are. Rather than changing the wording of the questions, the user of the audit tool could have a covering page that states, for example: "In this survey, the CEO means Joe Jones", or "In the survey, the OHS professional means anyone from the Health and safety department (Mary, Fred or Jack). The wide range of organizational structures that exist means that the administrator of the audit tool has to do some homework, to make it clear who is meant by "middle managers", and so on.

The Need for a Single Official Custodian of the Audit Tool: There should be a single entity charged with maintaining the "official" version of the audit tool. This entity

should also be charged with recalibrating it, revising and refreshing it, and setting standards or guidelines for the use of it—including training. The need for such a custodian becomes obvious if it is recognized that a single official version is necessary. If it is desirable to determine industry averages and to compare progress over time, then it is important to be assured that the same or equivalent audit tool is being used.

Having concluded that a single custodian of the audit tool is important, it should be noted that the questions of who should be doing audits, or training of auditors, or providing post-audit advice are completely different questions. Many groups inside and outside of organizations can engage in these functions.

We haven't a firm opinion on which entity should be the sole custodian. It doesn't have to be the MOL itself, but it is probably wise that it should subject to influence by the MOL if it is to have any relation to shaping MOL policy. The custodian should have the resources and the track record to warrant general confidence.

Many of the questions in the audit are such that revealing the answers could be damaging to the person answering the questions. A guarantee of anonymity will improve responses. In a full audit, where many senior people are surveyed, the degree of confidentiality declines. There may only be one person answering the survey questions at a given level; the CEO is an obvious example. Confidentiality for more senior people is of less concern than confidentiality for people without much direct authority or job protection. It should be kept in mind that non-unionized middle managers often have much less job security and are more vulnerable than many workers, and so confidentiality isn't something that only workers are concerned about.

Tinkering with Algorithms: When the data are entered into the Excel spreadsheet, the numbers are subject to a series of calculations. Some answers are weighted or discounted depending on the answers to other questions. It would cause a number of difficulties if the calculations were "tinkered" with by a user in a way that was not transparent to others. You couldn't properly compare audit scores over time or between locations if the calculations were different. Thus, we have attached "password protected" blank file of the Excel spreadsheet. This spreadsheet is the one that was used to analyze the trial audit tool. This spreadsheet will, of course, have to be modified when the audit tool is changed.

The MOL will have to decide who will be getting the password and under what conditions. Our suggestion is that widespread distribution of the spreadsheet not be accompanied by widespread distribution of the password.

Distribution of Questions or Model Answers: Distribution of the questions or "model answers" should be discouraged, as such familiarity will likely lead to answers that do not necessarily reflect reality. The audit questions will have a longer "shelf life" the more restricted the distribution is. We would not want to see the questions posted on a web site with the statement "check out your IRS here", as was suggested by one health and safety professional upon hearing of the nature of our study.

How to Refresh the Questions: One of the main outcomes of this study was a clear description of the IRS model. That model is where we go when we need to refresh the questions in the IRS audit. The multiple choice question (the 13-part Question 1a), because of its simplicity and commonality for all groups, is likely to have the shortest shelf life. Yet it is a key question. The greatest care should be given to rephrasing the statements in the question and shifting them around. In the larger set of questions, care should be taken to draft new questions that cover the same concepts and people as the questions being replaced. So that divergence among audit tools does not become too great over time, thus limiting comparisons, it is suggested that the MOL, or its designated custodian of the audit tool, send out official "editions", appropriately dated or numbered, every several years. New editions will be important not only to refresh the questions, but also, we assume, because there will be on-going efforts to recalibrate the audit tool.

Time Taken to Administer the Audit: How long should the audit take to do? There is a mini audit that can be done to give a snapshot assessment of the IRS, and that is the use of Questions 1a and 1b. This mini survey should be done with the first several levels of the organization. This will not take longer than 10-15 minutes per group of workers or supervisors...doing it in groups, but each person answering his or her own survey without discussion with others.

The longer survey, the full set of about 30 questions (e.g. for workers) will take roughly 30 minutes to do. If follow up oral interviews are done with selected individuals that will, of course, take longer.

Audit Frequency: Every organization in Ontario of any reasonable size ought to do a baseline IRS audit. If the results are poor, then the frequency of follow up audits would

be greater than if the results were excellent. In organizations where the IRS is working reasonably well, the organization probably doesn't need to do a full audit more often than once every several years, with an external body validating the internal audits every five years. An audit should be properly analyzed. More on this below, but the point is that there will (usually) be so much work to do fixing weak areas in the IRS, after an analysis of the audit results, that no one should be too quick to do another audit.

Using the Audit Results: It may seem obvious to many, but it is important to point out clearly, that the purpose of the audit is *not* to get a "score", or to "pass", or to be above average, or to just do better than the last time. The purpose is to gain insight into the specific areas where there are problems and then to take action to fix those problems. Subsequent "scores" will give you an idea whether your efforts to improve are having a measurable positive effect. It is the analysis and the action taken because of the analysis that is the main point, not the score.

In this regard, it is important to be clear that there isn't a pass mark. It is possible for an organization to do well on one part and do very poorly on another part. What is critical is that the time must be taken to delve into the analysis after the survey. The best approach is one of continuous improvement. Even the very best performers can find some areas that they might want to improve upon following an audit.

Evidence for Answers: In many of the questions in the audit tool, the respondent was asked to note down "evidence" for choosing the particular answer. This evidence was not used in the scoring. How is it used?

One purpose of it is to focus the respondent's mind on reality. We are saying implicitly—"don't just give us an off-the-cuff guess; if you have to prove what you did, how would you prove it?" We believe this gives better responses.

The second purpose is to provide a point of departure for the auditors when doing interviews. Interviews are not necessary, but they can be very helpful as part of the in-depth IRS analysis. After completing the questionnaire, a small subset of respondents can be kept behind while still holding onto their questionnaires. The auditor can, in confidence, quickly review the answers, asking questions about the evidence and hoping to focus in on the real problems that are causing the responses.

Fear of a Poor "Score": We have shown that when the IRS is not working well, an organization is likely to have more medical aid cases and lost time cases. Turning it

around, organizations with a lot of medical aids, and so on, are likely to be having IRS problems at the root of their workers' compensation problems. The MOL and the WSIB already have the information or the ability to get the information that would motivate them to visit a poor performer. The actual scores on an IRS audit aren't going to tell the government agents much more than they already know. It comes back to how the audit tool is to be used. It's not the score that matters the most, it's the weak factors that contributed to a low score that tell us something important. It's the IRS analysis, not the score, that points us in the right direction.

Sampling Strategy: Do you have to audit every single person in an organization, or just a sub-set of all people? For small organizations, one might as well give the audit to everyone. In very large organizations, it would be wise to sample at least 10% of workers and supervisors. Because there are fewer people in the higher levels of corporate structure, the percentage of people at each level surveyed will have to rise. You will be doing 100% of the CEOs in a company, as there is only one (this is usually true, but corporate structures can be complex).

The Cost Factor: Should Cost of Use Figure into Frequency and/or Scope of Use? This question was raised by the Steering Committee. Anything can be overdone, but we would expect that in most cases the IRS audit would not take up so much time that it would be a costly effort. We have mentioned that a mini-audit can be done with just the two-part first question. A full audit of all levels with a full array of questions would obviously take time. But it should be noted that the follow up oral interviews that we did in this study need not be done in a routine IRS audit. We were looking for insight into the clarity of the questions. An external auditor may also wish to interview people, but it is not always necessary. The IRS audit is sufficiently important and, we believe, insightful that an organization that balks at doing an audit due to cost is probably an organization that, right off, has some serious problems about the priority of health and safety.

Ensuring that Groups of Respondents are Matched: It is a small point, but it could possibly be overlooked. When administering the questionnaires to a group of workers, one must ensure that the front-line supervisors that are also surveyed are in fact the supervisors of the workers surveyed. The workers of the day shift should not be matched with the supervisors of the night shift. Groups of people have to be matched along the structure of the central core of the IRS. Similarly, the JHSC and the OHS professional have to be the ones associated with the particular workplace in question.

Ensuring that all Shifts are Sampled: If there are shifts, the audit should be applied to all shifts. There are very important differences between shifts. Different shifts can have strikingly different accident records in some companies. The IRS dynamic can according vary significantly. Putting junior, inexperienced supervisors on night shift can have a big impact of how the IRS functions, for example. The reduced likelihood of executives visiting the workers on the night shift can affect perceptions of OHS leadership.

Similarly, if there are more than one locations, then the IRS audit should apply to all locations, if the results are going to be analyzed in terms of the whole organization across all locations. If not, then there is nothing wrong with a localized audit.

Education and Training for Consistency of Use: There are several phases to the IRS audit, and different people might be involved in those different phases. Some training, however minimal, should be provided to the people physically handing out the surveys. They need to understand how to set the right atmosphere and to guard the integrity of the survey process. The people inputting the data would need different training, obviously. The people doing the analyzing should be people comfortable with quantitative analysis and OHS. The analysts, and those who apply the results, should be OHS professionals with solid understandings of the IRS, of OHS management systems and of the pitfalls of implementing remedies.

As to who should do the training of the audit administrators, it is suggested that whatever entity has custody of the "official" questions and algorithms, and who calibrates and amends the audit tool, should be the entity that has the largest role in training. But this can vary from doing the training, to training the trainers to merely setting standards for trainers.

Internal Auditors: We have been calling the JHSC and the OHS professionals the "internal auditors" of the IRS. If we mean it, then these people should be doing the IRS audit. We know that not all such indirect contributors to the IRS in all workplaces have as good an understanding of the IRS as they should. Certainly training is in order for people who will be doing the auditing, and we have mentioned that the custodian of the "official" version of the audit should have a key role in such training. The custodian may also be the entity to come up with guidebooks or manuals containing procedures and safeguards for the internal auditors to follow or apply.

External Auditors: Who should be the external auditors? What are the attributes of the outside auditors? We often call the MOL inspectors the "external auditors" of the IRS. This is true, but it doesn't necessarily mean they should be doing a formal audit of the IRS. Thinking it through, ask yourself would people feel comfortable answering a survey handed out by the very people who have the power to issue orders and lay charges? The concerns about confidentiality would be heightened. Thus, one of the attributes of the external auditors should be that they inspire confidence in the respondents regarding confidentiality.

Who are the potential external auditors? The WSIB has people involved in prevention, audits and "best practices", and any of these groups are candidates to be external IRS auditors. The Safe Workplace Associations and the Workers' Health and Safety Centre are also obvious possibilities. A decision should be made by the custodian of the official audit tool whether consultants and commercial entities should be using the IRS audit developed here. Certainly, nothing can prevent people from developing a similar audit tool, once the notion of doing IRS audits becomes commonplace. There is no fundamental reason why consultants could not use the audit tool provided they are doing so under agreement with the custodian of the audit tool so that certain standards are maintained.

Following-up on the Audits: It is just as important to decide who does the follow up to an audit as who does the audit. When an organization gets a low score on an audit, what then? Who do they go to for help? It's again obvious that any of the entities who are potentially external auditors can also fulfill the role of advisors as to how to improve the IRS. It will require education and some consistency, but we should expect many groups to be able to provide services in this area.

7. POSTSCRIPT

The IRS Steering Committee reviewed this report in its "draft-final" form (essentially Chapters 1 through 6), and discussed its contents and recommendations with us at a meeting on 18 August 2000. Subsequent to that meeting, and based on our recommendations presented in Section 6.2, the committee asked us to make revisions to the questionnaires administered during the trial audit of the six mines. The committee's instructions were as follows:[34]

SECTION 6.2 RECOMMENDATION	STEERING COMMITTEE'S INSTRUCTIONS
• Elimination of questions that tended to cause confusion	YES but only where existing report specifies the wording
• Decrease in the number of questions directed to senior management	NO
• Increase in questions to non-senior management about the beliefs and actions of senior management	YES but only where existing report specifies the wording
• Elimination of questions that had little contribution to the correlation with OHS performance	NO
• Change in wording of some questions so as to be more specific or more action oriented	YES but only where existing report specifies wording
• Re-classification of a small number of questions in the thematic clusters of questions used to focus in on the causes of IRS performance	YES but only where existing report specifies changes
• A change in the number and nature of the thematic clusters of questions	NO

We have carried out these instructions and the revised questionnaires are presented in Appendix 6. In order to make the changes clear to the reader, we have left all the original questions in place—those that are to be eliminated are "struck through", new questions are presented in **bold type**, and the questions that should be re-classified into different

[34] E-mail: T. Millard to M. Holliday (4 September 2000).

IRS-performance-indicator clusters are indicated with a boxed instruction. Subsequent to this, the Steering Committee saw fit to remove some of the new questions.

While we feel that the limited changes that have been made should lead to questionnaires that produce responses giving a better overall correlation with OHS performance, there is no way (short of conducting additional mine audits) of verifying this. This is because of the new questions that have been added.

7.1 AFTERWORD

It must be clear, to anyone who has made it to the end of what is a long and rather substantial report, that the relationships between the many aspects of the Internal Responsibility System and safety performance are complex. What is encouraging, is that this study, considered overall, shows clear evidence of a link between how the IRS functions and the safety record of the mines participating in the trial audit.

As may be gathered from our discussions in Chapters 4 and 5, there were problems in both the way some of the trial-audit questions were asked, and how they were grouped and weighted to analyze IRS functions. We feel that a more focussed analysis of the considerable wealth of data collected in the trial audit, than was permitted by the time and resources available to us in this project, would considerably improve the audit tool as it now stands. Thus we caution that, while the Excel spreadsheet (which, in its electronic form, is part of this report) was useful in helping the analyses reported here, there are problems in the underlying algorithms. Accordingly, if the spreadsheet is used in its present form, its results need to be treated with due circumspection.

In closing, we would like to share with you a response we received during a follow-up interview with an independent Director of one of the companies participating in the trial audit. When we asked the Director to briefly describe what, in their mind, is meant by the term "internal responsibility system", we received the following answer:

> *"The IRS starts with attitude ... a belief that everyone in the company owns a part of the system and that everyone should work together for safety. If people are just "doing compliance", then safety will be the last thing everyone does. Through leadership, encouragement, incentives, people will come to own safety as a way of life."*

We feel that this not only succinctly captures the essence of an effective IRS but also illustrates what we mean by a Board of Directors articulating a vision for OHS.